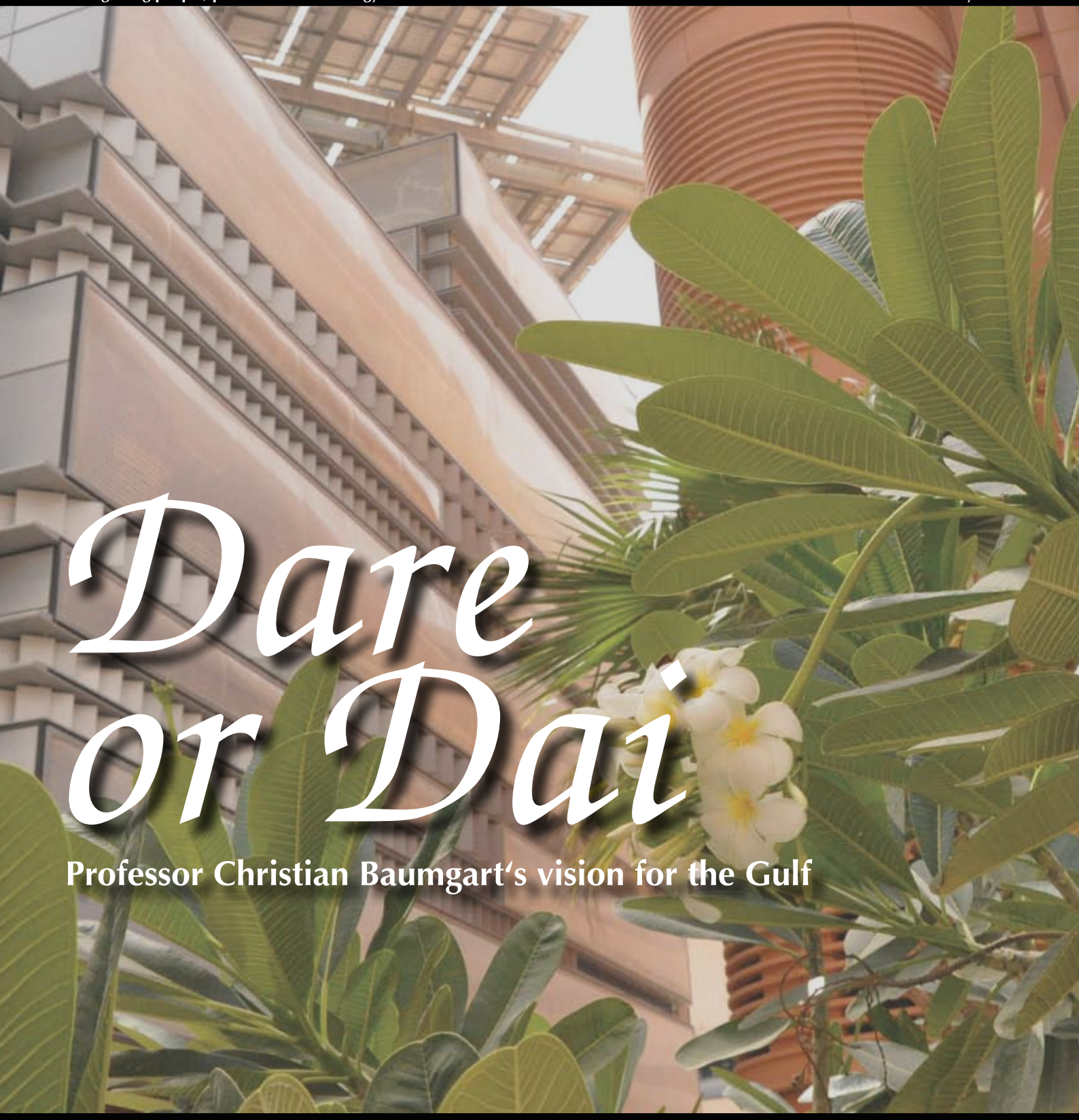
Facilities Management Magazine (GCC Edition)

THIS ISSUE

CIBSE on integrating building services engineers in FM
Accommodating different cultures the Jones Lang LaSalle way
BICSc and cleaning best practice
Interviews with MAF Dalkia and Emrill
Sustainable architecture for the 21st century
Portfolio accounting, energy audits and green mosques

"Integrating people, process and technology in our built environment" December 2013 - February 2014



Dare or Dai

Professor Christian Baumgart's vision for the Gulf

Volume 9/Issue 4 www.fmindustry.com

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A tide of optimism is sweeping across the Gulf in the wake of accelerating economic growth (even the International Monetary Fund has upped its 2014 aggregate forecast for the 6 GCC countries to 4.4 per cent), city-scale project announcements from Saudi Arabia, and Dubai's successful World Expo 2020 bid.

Yet as a service industry, facilities management rarely influences, but more typically mirrors, the fortunes of the property development and construction industries. Or does it?

In his seminal article, the President of the CIBSE invites *FM Magazine* readers to abandon any conception of facilities management as the final in a series of "linear" progressions associated with a building's life; in favour of a *cyclical* definition that recognises the requirement for continuous exchanges of information between FMs and other professionals involved in operating facilities (pages 28-31).

Recent reports of supply shortages fuelling property inflation across the Gulf might concern service providers by implying aggressive price competition is on the way in response to a shrinking, short-term pipeline of new properties to manage.

Nevertheless, the Chairman of the Merali's Group argues that "world-leading" innovations in property portfolio asset management accounting have resulted from a recent focus on maximising returns from existing portfolios (see page 8).

On page 60, Professor Werner Sobek states that innovation requires a willingness to push existing boundaries to the extreme, in an article describing the principles that have guided sustainable building design at one of the world's foremost architectural practices.

And in our cover article, the President of Germany's Federation of Architectural and Engineering Associations (the DAI), reminds us the GCC region has undergone such rapid "settlement development", that it would be unreasonable to expect governments to have focused extensively on economic and ecological considerations (see page 53).

Nevertheless, more proactive governments and municipalities in the region have been implementing policies to improve sustainability of our built environment; as can be evidenced by Abu Dhabi's addition of a "community" element to the Emirate's *Estidama* environmental rating system and recent amendments to Qatar's QSAS system. Not to be outdone, Dubai will also lead the region in sustainability when it implements its new *Green Building Codes* during the course of 2014.

American University of Sharjah (AUS) Associate Professor, Dr. Ahmed Mokhtar, believes *green* mosques will have a vital, future role to play in transforming cultural attitudes towards sustainability (pages 12-14).

And the Managing Director of Integrated Facilities Management (North Asia) for Jones Lang LaSalle, argues local culture is an essential consideration in service delivery to international standards (see page 19).

Cleaning standards are up for discussion in an article by the Group CEO of the BICSc (page 40).

And the Chief Executive of the UK's National Energy Foundation makes a strong case for regular, *internal* energy audits of facilities (see page 32).

MAF Dalkia's CEO, Andre Mussallam and Emrill's Managing Director, Ben Churchill are this issue's service provider interviewees. Although the questions we put to Mr. Musallam were more challenging, it might be noted Mr. Churchill was very brave indeed in allowing his management style to be scrutinised by one of the world's top workplace psychologists!

Said Rashid
Editor-in-Chief

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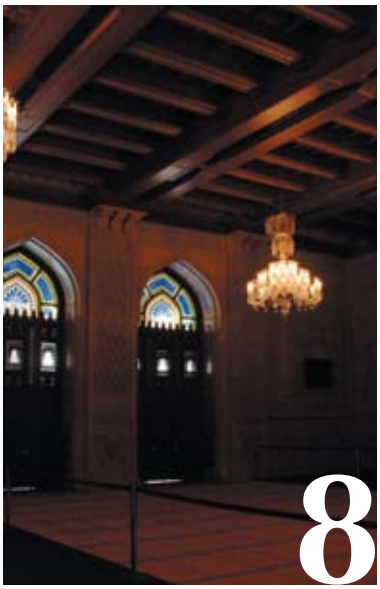

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Simone Gramegna Photography

TEAR DOWN THIS WALL!

Psychologist, Gillian Graham, discusses vortex cannon and how removing physical barriers to communication can improve employee collaboration (in addition to the minor matter of a 440 per cent profit increase) with Emrill's Managing Director, Ben Churchill.

Ben Churchill is speaking enthusiastically about Emrill's recent staff conference. "We built a vortex cannon that fired talcum powder smoke rings; except only larger and stronger since the vortices were able to knock paper cups off people's heads!" He then stops briefly to chuckle when he realises how whacky this must all sound, before stating his firmly held opinion that there is a solid link between the company's new *cannon* and improved sales figures.

Churchill then discusses the impact of first seeing Emrill's new *Values* video and the "powerful moment that can't be bought" when an employee who is interviewed during the course of filming it discloses that his initial apprehension about leaving Nigeria for Dubai evaporated on joining Emrill. "Abi even tells the producers that his mother, who is ill, cried with pride when she first heard he's found a new *family away from home* and can send money back to his country for what they need", Churchill says.

Next up is Emrill's famous *Blackboard Wall*. "One day, we used blackboard paint to create a huge blackboard on one of the office walls, placed a pile of chalk next to it and waited. The wall soon filled with messages from colleagues either thanking or congratulating each other or even the entire team".

Interestingly, the Blackboard Wall is one of few that remains in the building since, as Churchill explains: "early into my appointment I decided to remove the walls surrounding my office and sit right in the middle of the room. I then knocked down all walls in other offices so people could talk to each other and the reaction was overwhelmingly positive. Now, it really is a collaborative environment".

On hearing these stories you begin to realise that Emrill is no ordinary business. And it is anything but ordinary when measured by its results.

During the last four years profits have risen by 440 per cent, 2,500

new jobs have been created, and the company has been contracted to provide services for 22,000 new people.

Moreover Emrill has been voted, in no particular order, *Best Overall Company (Middle East)* and *Best Green FM Company (Middle East)* at the 2013 *FM Awards;* and *Best FM Company (Middle East)* at this year's *European CEO Magazine* awards. So what's the secret?

Churchill attributes Emrill's success to three things: common purpose, a commitment to continual growth, and genuine employee empowerment.

It has long been recognised that employees who find purpose in their work exhibit the highest degree of motivation. Rosabeth Moss Kanter, Ernest L. Arbuckle Professor of Business Administration at Harvard University, argues this is what differentiates successful from less successful employees and explains why they often *go the extra mile*. "People can be inspired to tackle impossible challenges if they care about the outcome", she writes.

Suddenly, building vortex cannon capable of knocking paper cups off fellow employees' heads at annual conferences takes on deeper significance. As Churchill himself admits, "I've been to a number of corporate conferences over the years and have found them all to be dry affairs lacking in inspiration".

The challenge this time, he says, was to organise something different, memorable and inspiring. "A *hunting and farming* theme came out of a pre-conference brainstorming session we ran; with farming representing working with existing customers and hunting, the process of getting new customers - in May we landed the Etihad Towers contract in Abu Dhabi which was a challenge that had once seemed impossible".

Continual growth is a sound that chimes loudly around Emrill: it helped Abi, the once frightened young man who left his family in Nigeria to write home and announce he had found a new one in Emrill.

Daniel Pink, author of the paradigmatic book, *Drive: The Surprising Truth About What Motivates Us*, argues that organisations pursuing continual growth must raise their goals whilst simultaneously providing individuals with the tools and support that are required to meet new challenges.

Ben Churchill echoes this sentiment when he says: "one of the principles I have is that we must live and breathe openness and collaboration. We have to demonstrate it all of the time and if we're not doing this, we're not being true to ourselves and it won't work".

He also defines his role as a Managing Director as creating an environment where "everyone can be the best they can be"; before adding that needlessly criticising employees who make wrong decisions is usually less effective than inviting them to ask themselves: "what am I going to do *differently* the next time the same situation crops up?"

Edward Deci, Professor of Psychology and Gowen Professor in the Social Sciences at the University of Rochester, has long argued employees only become truly empowered when they feel confident in their work abilities, are attached to the teams they work in, and believe they are in control of their goals; although it is important to stress that this state is not achieved overnight but as a result of patience and hard work.

Indeed, creating the right conditions for employee empowerment at Emrill took time. Churchill remembers the situation when he first arrived at the company. "Emrill had a reasonable reputation but no *voice*. It was a business that had undergone change and was on the right journey but was not going anywhere quickly".

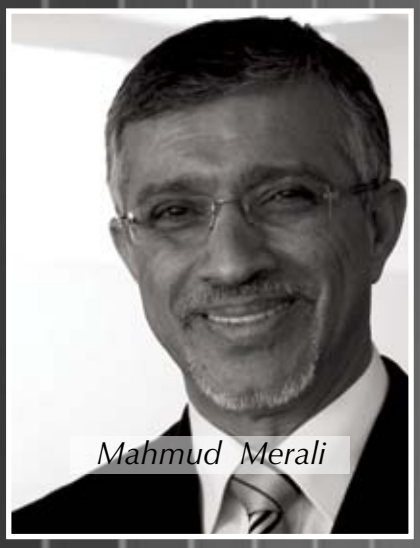
Indeed, it was only after introducing radical new ideas and approaches; sometimes in consultation with workplace psychologists, that Churchill created the conditions which have supported Emrill's phenomenal recent growth.

Given the company's performance, perhaps we should all be arranging annual conferences that fire vortex cannon smoke rings to knock paper cups off people's heads!

... WE MUST LIVE AND BREATHE OPENNESS AND COLLABORATION. WE HAVE TO DEMONSTRATE IT ALL OF THE TIME

LOOK WHO'S COUNTING

Historically, accounting methods used in portfolio asset evaluation across the Gulf have been less sophisticated than those of more developed economies. Mahmud Merali, Chairman of The Merali's Group and Executive Partner in multi-jurisdictional practice, Baker Tilly Merali's, argues this is changing as international accounting protocols are adapted to the region's needs.



Mahmud Merali

There has been a sea-change across the region that has seen even the largest master developers abandon speculative investment in new projects (the *build and they will come* approach that was ubiquitous prior to 2010), in favour of strategies designed to maximise financial returns from existing property portfolios.

Accompanying this shift has been a growing awareness of the need for more sophisticated accounting and asset reporting systems that are sufficiently adaptable and robust to cope with the additional requirements made by the huge amount of property and infrastructure development that has taken place across the Gulf in the last 20 years.

The accountancy profession is working hard to bring the very best practices in building management and lifecycle cost accounting to the GCC. However, closer examination of the relationship between the new breed of accountants and their government and developer clients suggests it is a symbiotic one.

A new requirement for large asset management studies of entire cities has resulted in the creation of innovative accounting techniques that apply recognised international accounting procedures on a scale that has not been attempted hitherto. Indeed, many of these procedures are so advanced they may genuinely be described as *world-leading*.

Dubai's Real Estate Regulatory Agency (RERA) *Construction Tracker* Study

One of the largest ever asset management exercises undertaken in the GCC monitored and tracked the progress of more than 1,000 development projects; capturing information information on buildings even as they were under construction.

The study was initiated in 2009 by RERA using pioneering, 5D citywide digital mapping and database technology supplied by a commercial partner.

This technology-led approach is now being considered by several master developers who are keen to record information about the condition of buildings in their property portolios.

Building Information Modelling (BIM)

Leading architects and designers are also increasingly using building Information Modelling (BIM).

In the United States, the National Institute of Building Sciences' (NIBS) publishes a consensus based standard (the National BIM Standard-United States or NBIMS-US™) which has been developed by referencing existing standards and can be imported by architects into 3D BIM software.

Whilst the application of BIM within property and facilities management is still in its infancy, it is abundantly clear that combining information from the procedure with lifecycle costing data will extend asset management capabilities within both sectors, strengthen systems used for capturing valuable information, and improve overall cost management across the design, procurement, construction and operation of built assets.

Asset Lifecycle Costing: Towards New Regional Standards

International and local expertise is frequently present on project teams assembled by global consulting firms in the Gulf and creates opportunities for developing new standards that combine the best components of different national and international standards; tailoring them to the needs of the region.

The United Kingdom's Royal Institution of Chartered Surveyors (RICS) which plays a global role in developing and promoting lifecycle costing, is active in the region through its many affiliated companies.

RICS Building Cost Information Service (BCIS) standard, Standardised Method of Life Cycle Costing, is used frequently in conjunction with the International Organization for Standardization's ISO 15686-5 Service Life Planning Part 5: *Life Cycle Costing* standard and will be enhanced further with the adoption of the forthcoming British Standards Institution (BSi) BS8544 standard – the first to be created specifically for modern building operations.

Unfortunately, the requirement for localised approaches to asset lifecycle accounting has not always been appreciated by international firms that have attempted to introduce home country approaches without understanding fully the intricacies or complexity of many projects in the region, or the lower operational skill levels that are being applied on assets they are taking on.

In the Gulf, projects that deploy lifecycle costing tend to be very large, complex ones. This makes it impractical for clients to use traditional, spreadsheet and database approaches to lifecycle costing.

BUILDING INFORMATION MODELLING (BIM)

BIM has been defined as: "a process involving the generation and management of digital representations of physical and functional characteristics of a facility"; and as a "shared knowledge resource to support decision-making about a facility from earliest conceptual stages, through design and construction, through its operational life and eventual demolition." (US National Building Information Model Standard Project Committee).

Coined by G.A. van Nederveen and F. P. Tolman from the Delft University of Technology, the term appeared in their 1992 paper, Modelling multiple views on buildings.

APPLICATIONS

In construction management BIM is used at the pre-construction stage to identify and address potential conflicts that may arise between a building's architectural, structural and mechanical, electrical and plumbing (MEP) systems; and to record additional vulnerabilities that may be identified during the construction phase.

In facilities management, BIM facilitates the transfer of a building to the operator by providing visual representations of critical systems. It can interface with electronic sensors and computer aided facilities management (CAFM) systems.

Although we are still experiencing the dawn of the marriage of advanced accounting systems with new technologies, the fact remains that these systems are nevertheless being developed.

Furthermore, developers and their operational teams are rarely experts on built environment asset management or lifecycle costing and assume consultants will deliver information that can be interpreted and implemented easily: quite the antithesis of the often huge spreadsheets and databases of asset and costing information that are still being delivered to project owners by many consultancy firms and deterring further adoption of lifecycle-based approaches to managing property developments.

At The Merali's Group, we have been working with our project partners to present asset information in a way that is easier to understand. By using graphical interfaces to display data from clients' developments alongside comparable maintenance and cost data from buildings in the UAE and incorporating maps, computer aided design (CAD) and BIM information; we have made it easier for operational staff to understand often complex collection, condition and lifecycle calculations. And by presenting all information visually, we have attempted to ensure the studies and systems from which data is derived become effective management tools which can *live* with the built assets they represent. Although we are still experiencing the dawn of the marriage of advanced accounting systems with new technologies, the fact remains that these systems are nevertheless being developed.

And, in light of the speed and scale of construction across the Gulf as a whole; and a growing appreciation of the need to better manage and look after the built environment, it is highly likely the most significant future advances in global asset management and lifecycle costing systems will originate in the GCC.

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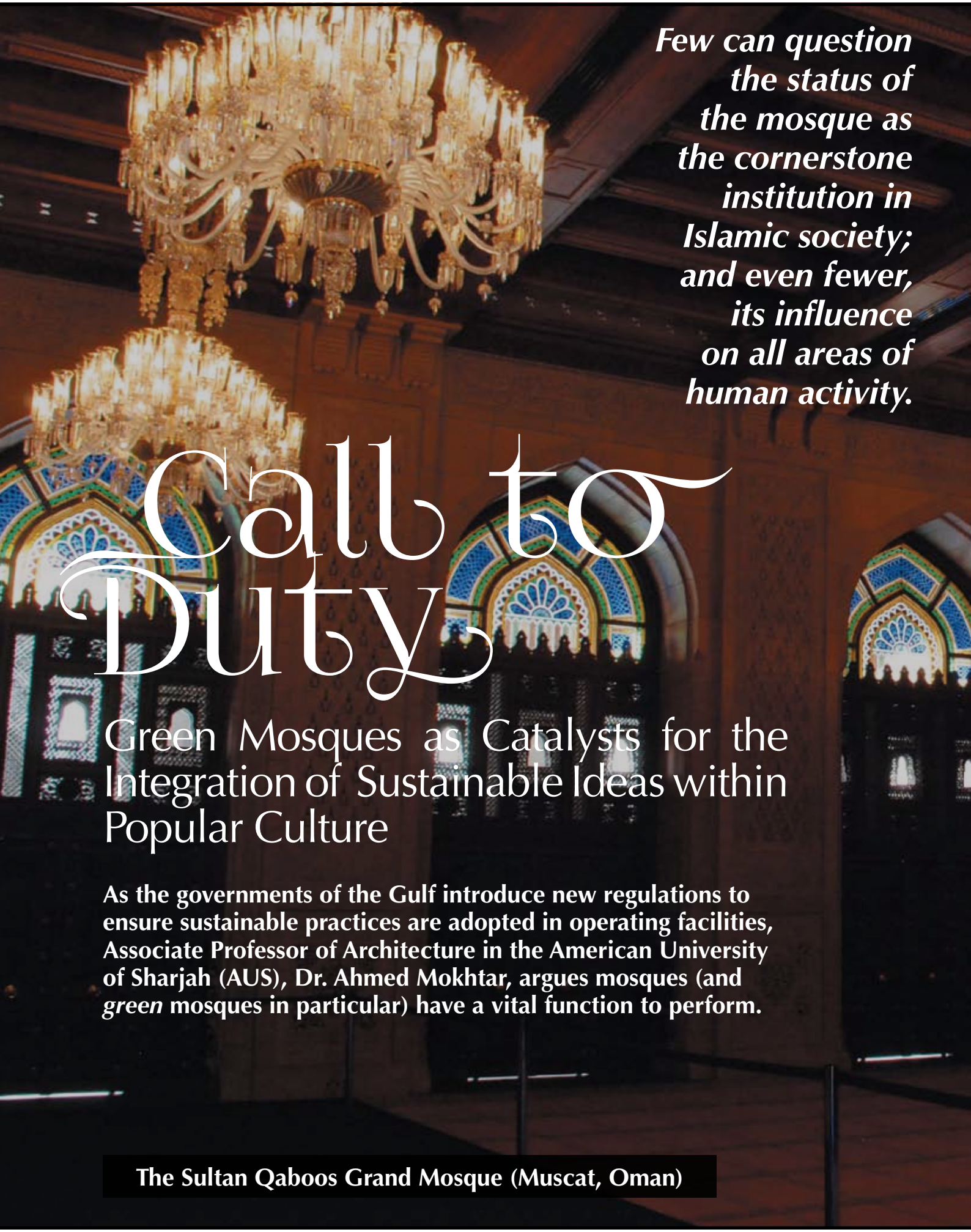


Few can question the status of the mosque as the cornerstone institution in Islamic society; and even fewer, its influence on all areas of human activity.

Call to Duty

Green Mosques as Catalysts for the Integration of Sustainable Ideas within Popular Culture

As the governments of the Gulf introduce new regulations to ensure sustainable practices are adopted in operating facilities, Associate Professor of Architecture in the American University of Sharjah (AUS), Dr. Ahmed Mokhtar, argues mosques (and *green* mosques in particular) have a vital function to perform.

The Sultan Qaboos Grand Mosque (Muscat, Oman)

In contrast to many regions of the world where public opinion provides the impetus for environmental initiatives, in the GCC, it is governments that are seeking to develop a *culture of sustainability* through regulation.

There are certainly advantages to regulatory approaches since they speed up implementation and build relevant capabilities quickly. On the other hand, if current initiatives are to succeed fully, greater public awareness of the need for sustainability will be required.

Indeed, the most effective policies are always those that command widespread support and encourage governments to adapt measures to the needs of local populations and businesses. And this is achieved only through public education.

Implementing sustainability

For any facility to operate in a truly sustainable manner, three preconditions must be met:

Availability of effective technology that is relevant to the building's application: in many facilities only technology can overcome physical impediments to better management of resources (including poor design and energy-hungry HVAC systems);

Availability of best practice guidelines, standards and regulations: for example, guidelines governing the detection of leakage in water closets, or ones that provide metrics against which future energy or water savings may be benchmarked; and

A high degree of public education: when building occupants or users have little or no awareness of how their behaviour can impact on the sustainability of a facility, even the most sophisticated resource management strategies and building control technologies will have little, if any impact.

In the Gulf region public awareness of environmental issues remains weak and effort is therefore needed to improve education by integrating sustainability into local culture.

The mosque as a catalyst for promoting sustainable practices

Few can question the status of the mosque as the cornerstone institution in Islamic society; and even fewer, its pervading influence on all areas of human activity.

The educational rôle of mosques is important for sustainability because their reach extends to all ages and strata of society.

As madrasah (buildings used for the teaching of Islamic theology and law) they guide the beliefs of future generations of citizens and the teachings of future clerics (Imams); and as places of worship, they are the sites at which Imams deliver guidance and religious mandates to a majority of the region's population in Friday sermons.

Islam requires Moslems to follow all religious prescriptions. And since natural resource conservation has always been part of Islamic theology, if they are presented as religious mandates, sustainability initiatives are likely to receive widespread acceptance.

Sustainability as a religious duty

Islam makes many references to conservation of resources; and water in particular. The religion also prohibits excessive consumption, more generally.

One of the most quoted Hadith (sayings of the Prophet Muhammad) is: "The Prophet (PBUH) passed by Sa'd while he was performing ablution [ritual washing] and asked: *"What is this? You are wasting water"*. Sa'd replied by asking: "Can there be wastefulness while taking the ablutions?" To which God's Messenger replied: "Yes, even if you take them on the bank of a rushing river".

The Qur'an also states (at Al-A'raf, 31): "But waste not by excess, for God loves not the wasters ..."

Clearly, similar concerns govern the modern concept of sustainable development which is defined by the World Commission on Environment and Development as: "development that meets the needs of the present without compromising the ability of future generations to meet their own needs".

Green mosques

A *green* (or eco-) mosque may be defined as one that has been designed to be a sustainable building.

Within the context of Islamic prayer practice, mosques become sustainable when they address two key areas of resource wastage:

(a) *Water consumption in ablution*

A single worshipper will use up to 10 litres of water in ritual cleansing prior to a prayer session; a volume that can reach astronomical proportions when it is multiplied (capacity at the *Masjid Al-Haram* in Mecca is currently being expanded to 1.5 *million* worshippers).

(b) *Energy consumption*

The second issue is designing prayer spaces to minimise energy (HVAC and lighting) consumption.

"The world is beautiful and verdant, and verily God, be He exalted, has made you His stewards in it". (Hadith)

"Whoever reclaims and cultivates dry, barren land will be rewarded by God for the act". (Hadith)

"But waste not by excess, for God loves not the wasters ..." (Qu'ran: Al-A'raf, 31)

"What is this? You are wasting water". Sa'd replied asking: "Can there be wastefulness while taking the ablutions [ritual washing]?" To which God's Messenger replied: "Yes, even if you take them on the bank of a rushing river". (Hadith)

Historically, architects have based the size of the main prayer hall in mosques on projected attendance figures for group prayer meetings on Fridays; rather than for other days of the week (when fewer numbers of worshippers will usually attend).

A related concern that is often addressed in green mosque design is poor indoor air quality (IAQ) resulting from excessive water usage and the installation of HVAC systems in ablution spaces.

Because the air handling units of HVAC systems recycle rising water vapour throughout a building, they can contribute to the growth of mould (especially in corner spaces of rooms used for ablution).

Green mosque architecture

Architects have been innovative in working with their clients and other built environment professionals to address consumption issues. They have introduced water recycling technologies, partitioned prayer spaces and redesigned air conditioning systems or replaced them with ceiling-mounted fans (which are less energy intensive and also eliminate potential problems with mould spores).

And, more recently, they have incorporated photovoltaic (solar) technology into the design of mosques that have been designed to be "green" from the outset.

Yet the impact of all these measures will only be limited if there is poor public understanding of why they have been introduced.

Educating the public

As buildings that are open to the general public, green mosques present unique opportunities

Ablution: *green* mosque architecture is addressing excessive water and energy usage.

for demonstrating the practical deployment of environmental processes and technologies in their design; and for explaining how it relates to traditional Islamic teachings.

Mosques are simple buildings that make it possible to demonstrate the application of sustainable building principles or incorporation of resource-efficient materials in their construction.

Furthermore, in the GCC, mosques are ubiquitous and by virtue of being public buildings, accessible to the majority of the population who use them regularly.

Multimedia presentations

In the 21st century, screen and web/smartphone multimedia presentations are widely used to communicating information to the general public. And to ensure the widest audience, screen-based presentations might be installed at mosque entrances; with content also made available for download via the web.

In addition to highlighting *green* architectural features, screen-based presentations might be used to re-enforce prescriptive passages from the Qur'an relating to sustainability; and to encourage worshippers to consider using greener technologies in their homes or work spaces.

Extending the role of the Imam

Imams are influential figures who are in an unique position to remind mosque-goers of the religious requirement within Islam for resource conservation and to re-enforce the message that practical measures may be taken to ensure buildings are operated in a more sustainable manner by demonstrating how the design of mosques conforms with religious mandates.

The region's governments are to be applauded for their leadership in introducing the regulatory frameworks that are necessary to ensure the long-term sustainability of the built environment.

With construction underway of Dubai's Awqaf and Minors Affairs Foundation-funded green mosque (the first to be built in the Gulf), new opportunities for integrating the principles of sustainability into local culture and the daily behavior of people will surely arise.

Architects have been innovative in working with their clients and other built environment professionals to address consumption issues. They have introduced water recycling technologies, partitioned prayer spaces and redesigned air conditioning systems or replaced them with ceiling-mounted fans

Abu'1 Walid Muhammad ibn Ahmad ibn Muhammad ibn Rushd (12th Century Islamic philosopher). Photograph courtesy of Antonio Crespo Márquez, Cordoba, Spain)

He said, She *said*...

A selection of quotes from within this issue of FM Magazine.

Without a common language and metrics for comparison, making sense of the corporate real estate portfolio can become an uphill task. Standardisation; be it of maintenance practices, business language, real estate terminology or portfolio metrics, allows companies to deal with complications in operating their facilities...

Ian Bottrell, Managing Director of Integrated Facilities Management (North Asia) for Jones Lang LaSalle on page 19.

MAF Dalkia's focus on, and commitment to, energy management is a result of Dalkia's position as the world leader in this area and the mission we share for preserving and sustaining our natural environment in the best possible way.

Andre Mussallam, Chief Executive Officer, MAF Dalkia on page 25.

Building services engineering and FM both cover the life of an asset; from concept design through to its operation, maintenance, disposal and eventual replacement. This is often portrayed as a linear process but, I argue, is understood better as a cycle of continuously improving functions.

George Adams, President of CIBSE on page 29.

Recent global studies (including those published under the United Kingdom's Technology Strategy Board's Building Performance Evaluation Programme) have found that, on average, non-domestic buildings use two-and-a-half times more energy than predicted.

Dr. Kerry Mashford, Chief Executive, National Energy Foundation on page 32.

Correct training of cleaning operatives and supervisors and skills refreshment are essential since agreed standards of service delivery are a pre-requirement of successful contract fulfilment.

Stan Atkins, British Institute of Cleaning Science (BICSc) Group C'hief Executive on page 43.

A new requirement for large asset management studies of entire cities has resulted in the creation of innovative accounting techniques that apply recognised international accounting procedures on a scale that has not been attempted hitherto. Indeed, many of these procedures are so advanced they may genuinely be described as world-leading.

Mahmud Merali, Chairman of The Merali's Group on page 8.

The Gulf region enjoys worldwide attention. It acts as a stimulus for the global economy and is a highly attractive destination for tourists not only from Western countries, but also for millions of people in the Far East. As such, the region bears a heavy responsibility which it generally lives up to. Two good examples of this are the Sultanate of Oman and Abu Dhabi's Masdar City; which demonstrates consciousness of tradition and historical forms within a new building project.

Professor Christian Baumgart, President of the DAI on page 53.

The imperatives of sustainability will lead to fundamental change in the traditional relationships between architects and structural design engineers, and other engineering and management consultants.

Professor Werner Sobek, Director of the Stuttgart Institute of Sustainability (SIS) on page 65.

I decided to remove the walls surrounding my office and sit right in the middle of the room. I then knocked down all walls in other offices so people could talk to each other and the reaction was overwhelmingly positive.

Ben Churchill, Managing Director of Emrill on page 6.

...when building occupants or users have little or no awareness of how their behaviour can impact on the sustainability of a facility, even the most sophisticated resource management strategies and building control technologies will have little, if any impact.

Dr. Ahmed Mokhtar, Associate Professor of Architecture in the American University of Sharjah (AUS) on page 13.

Tailoring FM

Ian Bottrell, Managing Director of Integrated Facilities Management, North Asia for Jones Lang LaSalle argues challenges faced in delivering facilities management to international standards within China and the Asia-Pacific region hold valuable lessons for companies tailoring best practice to their local market needs.


Ian Bottrell

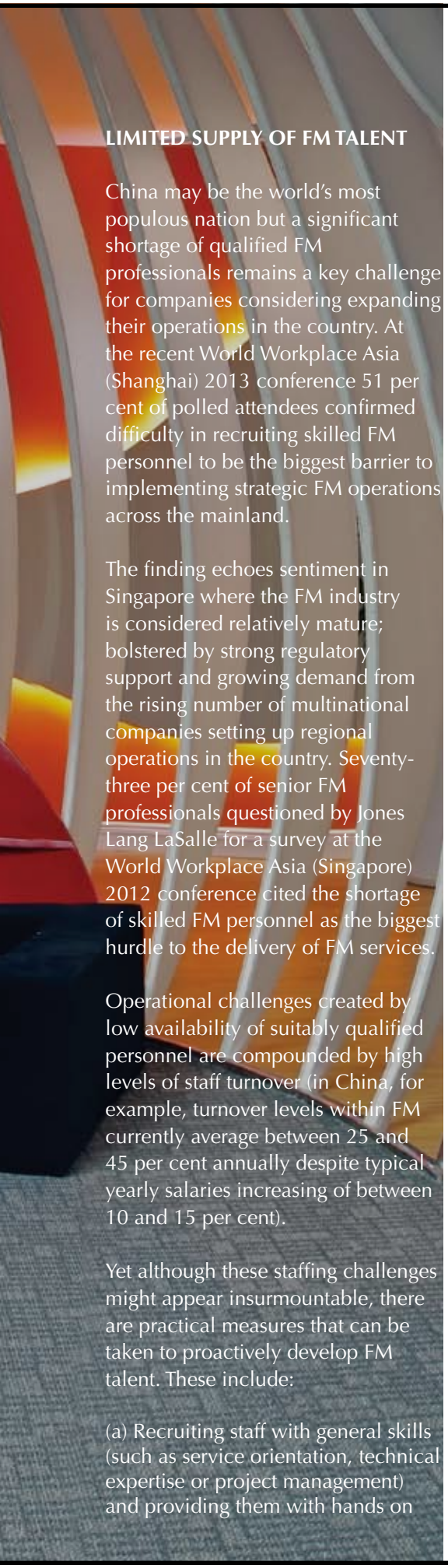
Step into Tencent's Dazu office in Shenzhen, China and you may just find yourself in awe of the creative office space designed with different visual themes for each of its eleven floors to inspire and accommodate its largely *Generation Y* staff. The traditional, gridded workspace has been transformed into a highly adaptive environment with modern facilities to encourage collaboration between employees.

Joining the ranks of the world's most enviable workplaces, China's largest internet company is taking a strategic approach toward talent retention and boosting staff productivity as it considers the changing needs of a relatively young workforce. Professional facilities management (FM) when delivered to international best practice standards can help support the creation of a more attractive working environment which, in turn, will support future talent attraction and retention.

Industry giants such as Tencent, Huawei, CICC and Lenovo belong to a new generation of young and dynamic Chinese company that is adopting FM outsourcing to gain a competitive edge against peers struggling with challenges such as accommodating headcount growth, attracting and retaining talent, boosting international credibility, and improving quality management and risk mitigation.

The benefits of successful FM implementations are many but achieving international best practice in emerging markets can present challenges. Let us consider the most common obstacles and the strategies that are being devised to overcome them in China and other major Asian economies.

Tencent's Shenzhen office: innovative, open space that encourages mobility and collaboration



LIMITED SUPPLY OF FM TALENT

China may be the world's most populous nation but a significant shortage of qualified FM professionals remains a key challenge for companies considering expanding their operations in the country. At the recent World Workplace Asia (Shanghai) 2013 conference 51 per cent of polled attendees confirmed difficulty in recruiting skilled FM personnel to be the biggest barrier to implementing strategic FM operations across the mainland.

The finding echoes sentiment in Singapore where the FM industry is considered relatively mature; bolstered by strong regulatory support and growing demand from the rising number of multinational companies setting up regional operations in the country. Seventy-three per cent of senior FM professionals questioned by Jones Lang LaSalle for a survey at the World Workplace Asia (Singapore) 2012 conference cited the shortage of skilled FM personnel as the biggest hurdle to the delivery of FM services.

Operational challenges created by low availability of suitably qualified personnel are compounded by high levels of staff turnover (in China, for example, turnover levels within FM currently average between 25 and 45 per cent annually despite typical yearly salaries increasing of between 10 and 15 per cent).

Yet although these staffing challenges might appear insurmountable, there are practical measures that can be taken to proactively develop FM talent. These include:

(a) Recruiting staff with general skills (such as service orientation, technical expertise or project management) and providing them with hands on FM training to widen the talent pool;

(b) Creating clear, long-term career progression opportunities to retain talent and support succession planning at all levels; and

(c) Partnering with industry organisations to develop in-house talent and ensure *front row* access for new talent coming through the ranks.

THE CHALLENGES OF MULTI-COUNTRY SERVICE DELIVERY

Across Asia delivery of FM best practice in reception, janitorial, security and landscaping services often poses problems as a result of local nuances.

Without a common language and metrics for comparison, making sense of the corporate real estate portfolio can become an uphill task. Standardisation; be it of maintenance practices, business language, real estate terminology or portfolio metrics, allows companies to deal with complications in operating their facilities in line with international best practices.

By way of example, China is a developing economy that depends heavily on migrant workers who are often an important source of labour for soft services. Usually, these workers have attained a lower level of educational achievement than the average population (just 10 per cent of migrant workers currently in the country have experienced education beyond middle school).

When combined with language and dialectic barriers, low levels of literacy can represent a significant obstacle; although one potential solution might be to develop flexible, descriptive and pictorial training programmes.

Meanwhile in India (where 38 per cent of companies that responded to a global survey expect real estate portfolio growth over the next three years), the country's vast cultural diversity is one of the biggest challenges to workplace transformation and the creation of productive and coherent work spaces, since a tailored approach based on a deep understanding of the country is required to accommodate the wide array of languages, religions and cultures.

INCONSISTENT SERVICE DELIVERY

Companies expect consistency in the quality of office space and maintenance across their portfolios.

In China, the sheer size of the country and its cultural diversity across hundreds of cities may function as a roadblock to implementing consistent best practice in FM.

Industry giants such as Tencent, Huawei, CICC and Lenovo belong to a new generation of young and dynamic Chinese company that is adopting FM outsourcing to gain a competitive edge

Local teams may not have a grounded understanding of FM functions, and language barriers may lead to miscommunication between remote and central FM teams.

The absence of appropriate maintenance service providers in Tier II and Tier III cities in particular can cause unanticipated issues since few vendors can cover the whole country and none can guarantee a best-in-class service in every geography.

Even relatively low-skill services like cleaning suffer from a lack of quality vendors in remote locations which triggers outsourcing of services to FM partners that have the capabilities to deliver. For example, specialists from Singapore have been flown to China to run maintenance of the clean room and wider facility equipment for a major microchip manufacturing plant in a Tier II city due to the lack of qualified vendors able to deliver locally.

Companies can nevertheless take the lead by providing supplier and vendor training to mitigate the risk of poor service provision across a portfolio.

BENCHMARK DATA & METRICS

Analysis of benchmark data on the cost and quality of maintenance, utilities and security will highlight whether facilities are being run at optimal efficiency. Many companies maintain inadequate portfolio data on rudimentary systems leading to poor information for decision-making.

As a first step companies might extract data from a portfolio to use as an initial point of reference and benchmark their operations across sites and over time.

The most successful models combine the right technology with the right processes and people for data collection and management.

Companies might also consider adopting technology solutions to automate processes and procedures; and thereby create greater efficiencies and consistency.

MOTIVES FOR OUTSOURCING

Outsourcing FM services to specialist providers can be an effective way of gaining access to international industry best practice in emerging markets.

However, it is important to understand the motivation behind outsourcing decisions since reasons can encompass everything from the desire to achieve cost savings or minimise non-core business activity; to achieving improvements in innovation, a requirement for greater transparency, and improved energy efficiency in response to regulatory pressure to meet sustainability targets.

Whilst FM outsourcing in China remains in its infancy with companies adopting a cautious attitude and choosing to deploy in-house models utilising basic out-tasking of services such as cleaning, catering or maintenance, the practice is set to become more commonplace as the landscape becomes increasingly competitive.

Chinese companies may not always be driven by cost savings but do seek to leverage outsourcing as a vehicle for improving standards and enhancing their brand image and overall reputation.

And, as they take to the international stage, improving transparency and ethics will become increasingly important since a robust FM structure based on open and transparent procurement and cost structure models minimises the risk of fraudulent behaviour.

Recent years have witnessed a surge in demand for FM services in Southeast Asian countries such as Indonesia. Whilst their motivation is mainly cost-driven, large local companies are embracing a new trend that favours outsourcing.

As a result, these companies are reaping the benefits of successful FM implementations; including improved space planning, portfolio optimisation, advanced quality management across facilities, and improved risk governance.

FM outsourcing is a relatively new concept for companies in Japan where the FM market is mature in comparison to its Asian counterparts.

Japanese business culture is shaped by the traditional values of politeness and a manufacturing mentality that stresses standardisation and high-quality service delivery; accompanied by antithesis towards outsourcing.

The FM market may therefore be one that is hard for service providers to penetrate although, for Japanese corporates looking to expand their portfolios overseas, outsourcing is increasingly gaining acceptance as a complementary method of achieving delivery on-time and on-quality.

LOOKING AHEAD

Facilities managers are increasingly under pressure to drive down the total cost of occupancy whilst making portfolios highly responsive to a rapidly changing business environment.

In dynamic Asia, these challenges are magnified by the geographical scale of the region, language and cultural differences, and the presence of mature, emerging and frontier markets.

Yet broader principles can be extrapolated from the Asian experience and applied to facilities management in multicultural cities where understanding and accommodating the needs of staff who often come from different ethnic and social backgrounds will improve an organisation's ability to attract and retain the best talent.

Moreover, despite cultural differences in countries across Asia, the most successful companies are those that cultivate and manage their relationships with vendors, partners and regulatory bodies.

Consistency is essential since companies everywhere expect high-quality services to be delivered efficiently and cost-effectively.

... broader principles can be extrapolated from the Asian experience and applied to facilities management in multicultural cities where understanding and accommodating the needs of staff who often come from different ethnic and social backgrounds will improve an organisation's ability to attract and retain the best talent.

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Vive la différence

As facilities managers increasingly assume responsibility for building operating costs, FM Magazine discusses MAF Dalkia's energy-centric service delivery model with chief executive officer, Alexandre Mussallam.

"MAF Dalkia has been very effective at introducing the energy management concept into the Middle East by focusing on technical deliverables," says chief executive officer, Alexandre Mussallam. "We believe the combination of energy and facilities management services is one of the pillars of our success".

With more than 5,000 sites under its management, the joint venture between the United Arab Emirates' Majid Al Futtaim (MAF) Group and global French energy giant, Dalkia, is indisputably one of the largest facilities management companies in the region.

FM Magazine was keen to discover, however, whether the company's energy-centric delivery model differs significantly from those of other service providers.

Does MAF Dalkia subcontract any facilities management functions to third-parties?

Company policy is not to subcontract multi-technical or energy related functions unless there are valid reasons for doing so.

Valid reasons will include regulatory or legal restrictions limiting the scope or nature of the work we can undertake; with typical examples being local laws governing the provision of fire detection or prevention services and contractual terms stipulating which companies can supply spare parts or consumables.

There will also be rare occasions when our teams will not have specific skills that may be required to work with equipment from particular manufacturers.

But, in general, we only subcontract soft services to third parties since this complements our strategy of maintaining the company's position as the leading, multi-technical energy services provider in the region.

How do you ensure quality standards are maintained by soft service providers across multiple facilities?

When services are subcontracted, MAF Dalkia has a strict policy of ensuring delivery meets international industry standards.

We include key performance indicators (KPI) within service level agreements (SLAs), and insist that expertise relevant to the services that are to be provided is present within subcontractors' management teams.

Our quality management system also gives clients an additional layer of protection by governing all procedures used in assessing, selecting and monitoring subcontractors.

You have made inroads into commercial facilities management following your appointment as service provider to Standard Chartered Bank's UAE branch network. What other sectors and markets will you be targeting and why?

Although the Standard Chartered Bank contract is very significant for us, we already had financial sector references across the region. And the sector remains one of our most targeted simply because we have acquired the knowledge that is necessary to excel at service delivery.

We have also gained similar levels of expertise in other sectors, ranging from telecommunications to education; and our vision is to enhance facilities management provision within these sectors by bringing Dalkia's global expertise to the regional market.

The Healthcare sector is evolving rapidly across the region and since Dalkia is a dedicated building energy services provider to hospitals and medical facilities globally, we believe we can leverage our expertise to achieve savings for clients.

We will also be targeting the aviation sector to complement our existing expertise with Sharjah International Airport.

Can you quantify energy management as a percentage of total facilities management expenditure in general, mixed-use facilities?

We estimate 60 per cent of total operating costs relate to energy. This is generated mainly by HVAC systems.

Does this explain your company's obsession with energy-related services?

MAF Dalkia's focus on, and commitment to, energy management is a result of Dalkia's position as the world leader in this area and the mission we share for preserving and sustaining our natural environment in the best possible way. We recognise there are different paths to achieving long-term savings for clients; however, energy management does play a pivotal role.

MAF Dalkia's focus on, and commitment to, energy management is a result of Dalkia's position as the world leader in this area

The wider MAF Group operates with a high degree of governance to ensure qualified service providers and contractors are evaluated rigorously as part of any tender process.

Would it be fair to describe your company's primary function as "in house" facilities management provider to MAF Group's principal operating company, MAF Properties?

MAF Dalkia is not an "in house", facilities management services provider to MAF Properties. The recent project awards from MAF Properties to MAF Dalkia were the outcome of floated requests for proposals (RFP) and our company was selected for several reasons. These included international delivery standards, competitor benchmarking and value for money.

The wider MAF Group operates with a high degree of governance to ensure qualified service providers and contractors are evaluated rigorously as part of any tender process.

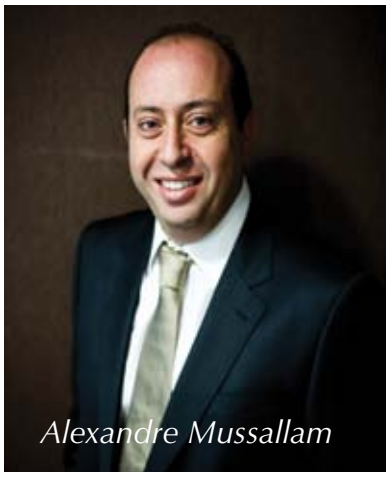
MAF Dalkia is therefore required to adhere to standard market practices and procedures and meet all contractual bonding requirements defined within SLAs. Moreover, because we focus primarily on the delivery

Arcapita Bank Headquarters Building, Bahrain Bay, Manama

of multi-technical and energy management services, we can still engage with companies that provide traditional "facilities management" services.

Dalkia is one of the world's largest energy services companies. Does the marketplace perceive MAF Dalkia primarily as an energy management or facilities management services provider?

MAF Dalkia remains committed to being the leader in building energy services, however, across the region, we are overwhelmingly perceived as a multi-technical services company that includes energy management within its core services offering.



Alexandre Mussallam

It is in our opinion that energy savings are inextricably linked with the provision of multi-technical services: you can rarely achieve one without the existence of the other.
Even when we deliver traditional facilities management services, we remain alert to any potential for energy savings: such is the degree to which energy management concepts are integrated into our daily routine.

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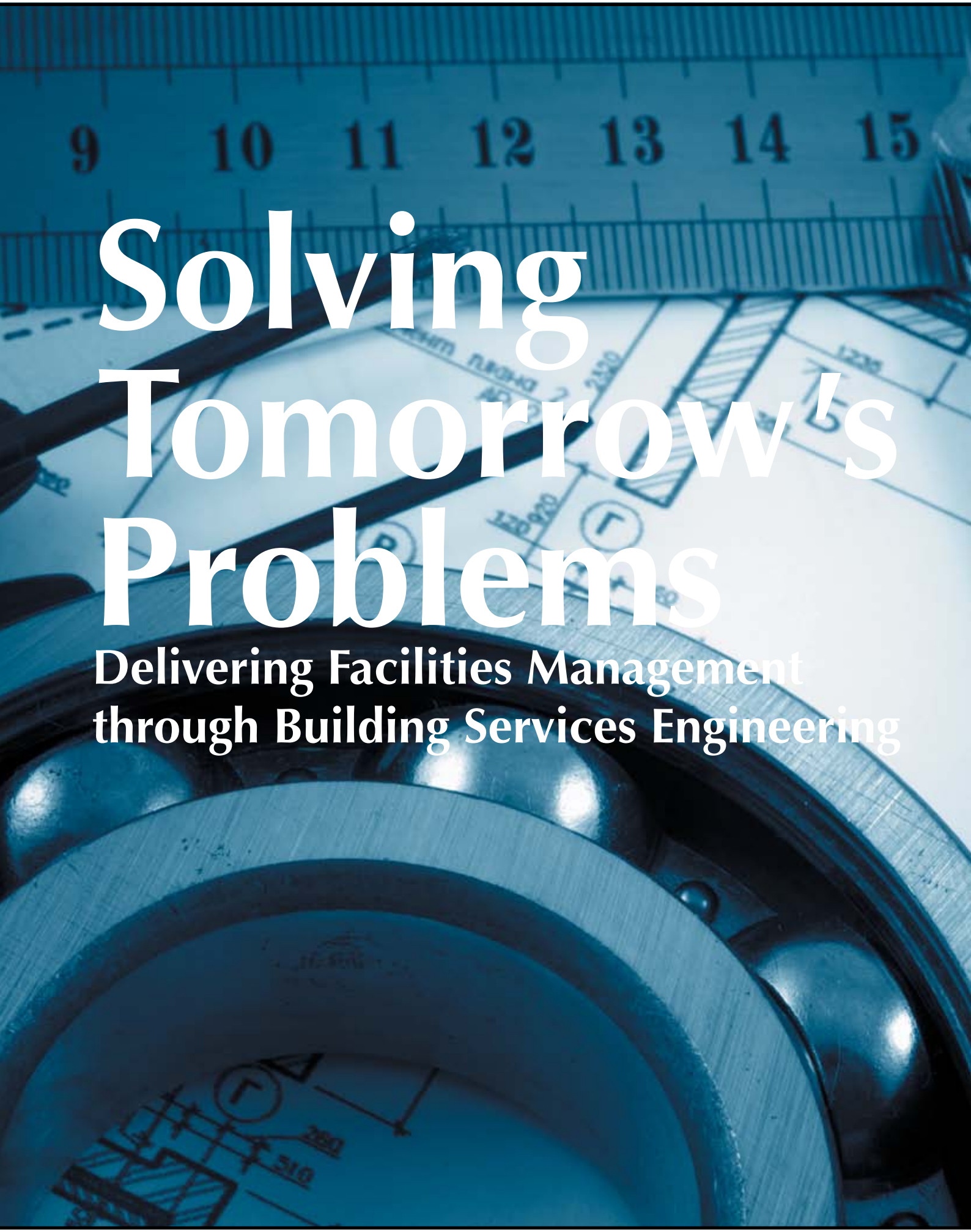

Solving Tomorrow's Problems

Delivering Facilities Management through Building Services Engineering

George Adams, President of the Chartered Institute of Building Services Engineers (CIBSE), identifies the opportunities for greater integration of building services engineers within facilities management and the wider community of built environment professionals.

The built environment is hugely important for the economic and social wellbeing of any country.

Infrastructure, transport and buildings all contribute to the functionality, effectiveness and liveliness of our homes, work spaces or play areas.

Equally, their efficient operation is a central consideration in wider environmental challenges (for example, government plans in the United Kingdom to reduce carbon emissions by 80 per cent over the next 36 years).

And building technology and systems become more complex, facilities operators are turning their attention increasingly to in-use performance levels.

Improving facilities management (FM) delivery through better energy management is one area building services engineers excel at.silos.

DEFINING BUILDING SERVICES ENGINEERING (BSE)

Typically a range of responses is prompted by the question: "What is building services engineering?"

George Adams

According to one school of thought, it is the design, manufacture, installation, operation and maintenance of all "energy-using" systems in a building.

Yet to others, it is a discipline that focuses on heating, ventilating and air conditioning (HVAC) systems.

Companies in the sector might describe themselves as mechanical, electrical and plumbing (MEP) contractors or as specialists in the design, installation and maintenance of electrical supply and/or lighting systems.

Regardless of their specialism, however, BSE professionals are responsible for systems that deliver functionality to buildings and make them fit for the business or social activities they are designed to support.

Building services engineering and FM both cover the life of an asset; from concept design through to its operation, maintenance, disposal and eventual replacement. This is often portrayed as a linear process but, I argue, is understood better as a cycle of continuously improving functions.

Regardless of their specialism, though, building services engineers are responsible for systems that deliver functionality to buildings and make them fit for the business or social activities they are designed to support.

Building services engineering and FM both cover the life of an asset; from concept design through to its operation, maintenance, disposal and eventual replacement. This is often portrayed as a linear process but, I argue, is understood better as a cycle of continuously improving functions.

Many engineered systems in a building will be replaced more than once during its life. And this challenges the traditional compartmentalisation of the building life cycle into different stages or *silos;* under which FM is labelled an operational and maintenance activity that must accept (and make the most of) whatever is passed down to it by design and installation silos.

This is why I called for a new engineering conscience in the *Whole Life Thinking* strategy I outlined in my inaugural address as CIBSE President.

FMs with building services engineering training can assist with preventative maintenance

ENGINEERING BETTER OUTCOMES

Many services systems become noticeable to occupants only because of the movement of indoor air, quality of illumination in communal spaces, variations in temperature, security issues; or because of changes to their health and physical comfort levels.

Building services engineers and FMs really must work more closely to play a fuller part in making facilities nicer places to occupy and more efficient to operate since, when problems occur, FMs and building occupants want them resolved quickly and with a minimum of disruption.

How this is achieved depends on the relationship and nature of the contractual engagement between the FM team and contractors they call on to attend to malfunctioning systems.

It also depends, however, on facility design, the preparedness of operators to deal with unforeseen circumstances, the quality of the FM team's training and its understanding of how systems ought to operate.

Since most buildings today incorporate inter-dependent services and systems in their design, a strong case may be made for extending building services engineering training and knowledge to all FM teams.

Notwithstanding the obvious benefits for building occupants, specialist training results in better in-house problem solving capabilities and equips FMs with the knowledge they need to communicate effectively with specialist suppliers - or even to implement functional changes in buildings.

What unites the diverse FM models is they all need ready access to engineering skills in order to resolve problems within a reasonable timescale.

To minimise future problems, FMs need to develop preventative maintenance programmes that make full use of in-house engineering capabilities.

FMs with engineering training might support building services engineers by contributing to original building design and, more significantly, the upgrade and replacement of existing systems since, from an operating perspective, they are best placed to understand potential pitfalls pertaining to a particular facility.

Involving FMs in decision-making and engaging them at the earliest opportunity in a facility's design also offers several, additional benefits; including reduced operating costs and less downtime.

Furthermore, by drawing on the engineering skills of the FM team early in the design process, building services engineers will ensure full adaptation of designs to expected operational demands and anticipate any future requirements.

Close cooperation between the professions will also ensure future maintenance is a consideration in architectural designs; contributing further to whole like thinking and the concept of continuous improvement.

A range of tools can assist FMs. CIBSE Guide, *Maintenance Engineering and Management*, provides extensive advice on the maintenance of building services and recommendations for the most appropriate levels of maintenance activity across a range of services; in addition to offering guidance on replacement cycles and service lives. Furthermore, it is now supported by British Standard BS 8544 (Guide for life cycle costing of maintenance) which offers detailed advice on the preparation of life cycle cost plans for buildings.

Indeed, it might also be noted BS 8544 is aligned with the Royal Institute of Chartered Surveyors' (RICS) *National Rules of Measurement* which encourage co-ordination between the work of BSI, CIBSE and RICS.

Two other areas where greater integration will increasingly be required between building services engineers in FM and wider construction and commercial teams, are energy efficiency and corporate responsibility.

There is a growing regulatory requirement for larger businesses to measure and report energy use and carbon emissions. In some cases (such as the United Kingdom's Carbon Reduction Commitment) payments must also be made depending on emission output volumes.

The second area relates to climate change since, notwithstanding debate about whether it is a direct result of carbon emissions generated by human activity, the world is warming and our climate is experiencing more frequent occurrences of severe weather events which impacts directly on our built environment: witness recent reports about low-lying islands and coastal areas facing catastrophe in the event of global emissions targets not being met.

CIBSE is now developing thought leadership in the built environment and working together with the Royal Institute of British Architects (RIBA) to support the technical challenges associated with reducing carbon emissions, mitigating heat island effect (built-up areas are warmer than surrounding rural areas), and creating more sustainable local urban environments.

These activities are running in parallel with an initiative by RIBA to improve collaboration between all disciplines involved in the total built environment and reflect a joint focus on sustainability that encompasses building operations and whole life performance.

Increasingly, and regardless of who or whatever is causing climate change, our buildings will have to be adapted to it. Engineers in FM teams will play their essential part in identifying and developing strategies to mitigate the potential impact of a range of climate-related events on buildings, businesses and social facilities. And they will be working alongside other built environment engineers and architects.

Energy efficiency and corporate environmental responsibility will align as we develop plans for our cities for the rest of the 21st century and seek to make them more resilient to the effects of climate change by reducing demand for fossil fuels, embedding local energy generation into the built environment, and work with landscaping specialists to green local communities (green roofs, green walls and tree canopies are proven remedies against heat island effects and reduce carbon emissions).

These are strategic challenges for our society and will require a more collaborative built environment industry.

Given the importance of facilities management to business stability and the increased focus on energy management, there are huge opportunities to develop the role of the FM engineer into a specialist whose competences extend beyond delivery of daily operational support to anticipating future business needs.

Today most buildings incorporate inter-dependent services and systems in their design. This suggests a strong case may be made for extending building services engineering training and knowledge to all FM teams.


Kerry Mashford

WHY? WHEN? HOW?

Dr. Kerry Mashford, Chief Executive of The United Kingdom's National Energy Foundation (NEF), which has been at the forefront of improving energy use in buildings since 1990, argues evaluating a building's energy performance is an essential component of *smart* energy management.

Faced with the urgent and important demands that facilities managers are presented with every day, it's understandable that the equally important but less immediate challenge of optimising energy efficiency often has to take a back seat. It's often difficult, messy and complex to understand how much energy your building is using, and how to break energy down into end-uses, time periods, zones and even tenants. Then there's the question of differentiating the building's intrinsic energy use from that needed to run its operations and activities. All told, it isn't surprising that, in spite of the rhetoric surrounding the energy performance of buildings, relatively little is done in practice.

Why and when to evaluate?

There are many reasons for evaluating the energy performance of your building. However, regardless of whether you're taking over ownership or tenancy; and even of whether a building is newly built, refurbished or established, you should never rely solely on theoretical performance assessments.

Compliance certificates - for example, Energy Performance Certificates (EPCs) and Building Regulations UK Part L (BRUKL) Certificates in the United Kingdom, are issued on the assumption that any building *as built* will mirror the *as designed* performance characteristics of its fabric and services. And although these are theoretically the same, in practice they aren't.

Recent global studies (including those published under the United Kingdom's Technology Strategy Board's *Building Performance Evaluation Programme*) have found that, on average, non-domestic buildings use *two-and-a-half times* more energy than predicted.

This performance gap arises from a combination of factors but evaluating the energy performance of your building as part of the hand-over process will enable you to ensure the fabric is up to scratch; and that services are installed and commissioned properly. The flip side of this is if you're responsible for marketing a property, potential tenants and purchasers are going to be interested increasingly in *as built* performance figures.

ENERGY PERFORMANCE MODELLING

The United Nations Environment Programme (UNEP) estimates buildings contribute a third of total greenhouse gas (GHG) emissions as a result of the use of fossil fuels during their operation.

As part of their commitment to reducing GHGs, many governments require developers to submit theoretical calculations of a new-build or retrofit project's energy consumption at the planning stage.

Software tools for forecasting energy flows include the Simplified Building Energy Model (SBEM) developed by the UK's BRE to meet European Union Energy Performance of Buildings Directive (EPBD) non-residential building certification requirements and the US Department of Energy (DOE) EnergyPlus simulation tool which predicts HVAC and lighting energy use.

Environmental assessment methods (including BREEAM, LEED, DGNB in Germany and the newer ESTIDAMA and QSAS methods in the Middle East) rely on theoretical energy modelling.

With buildings that you already own or occupy, evaluating energy performance equips you to manage energy use better on a daily basis, and to identify and prioritise opportunities for energy-related improvements.

And although there are different motives for undertaking evaluations; including capital investment, education and building management modifications, it is certain areas for energy saving will be identified: one well-known United Kingdom property owner found it was able to save 20 per cent on landlord energy use through basic, low-tech measures, and to negotiate better energy tariffs by adjusting demand dynamically after smart, real-time monitoring of energy use patterns in its buildings.

Comparing the energy performance of buildings in your portfolio and comparing individual buildings to others of a similar design or category, gives a real sense of how big opportunities for improvement can be and enables you to focus clearly on the low-hanging fruit of energy inefficiency.

A number of web-based tools are available (some for free) including *Carbon Buzz* and *Energy Deck*. *Carbon Buzz*, compares the "energy intensity" (annual energy use per square metre) of any given building against CIBSE TM46 sector benchmarks and data from other buildings that can be filtered to include those which are similar to yours.

Even if you don't compare energy use in your own building or buildings with others, tracking energy use over time enables future targets for reduction to be set and underpins investment decisions. For example, if service equipment becomes inefficient as it ages, monitoring energy use can alert you to equipment failures, unauthorised reprogramming of controls or changes in occupancy; and enable you to respond quickly to building occupant needs without wasting energy.

The final reason for evaluating energy performance in buildings is to protect the value of property assets and avoid any potential threat of regulatory obsolescence if performance fails to meet standards that may be required at the time of any future transfer of ownership or tenancy.

HOW TO EVALUATE?

The old adage: "if you don't measure it, you can't manage it" applies. But what should you measure? How? How often? And how should you interpret any data?

Energy performance evaluation is a significant subset of overall building performance evaluation and, I would argue, provides valuable additional insight into why energy is used; in addition to where and when.

For in-use buildings, best practice is to carry out periodic studies (for example, during the summer and also in the winter).

Changes of circumstance; for example, in the use of a building or as a result of the replacement of key equipment, will also trigger a requirement for a new study.

All evaluations should draw on data captured over the whole year; and typically, half-hourly meter data, internal and external temperature records and services operating records.

Using a spreadsheet-based tool such as CIBSE TM22, you can capture and document the energy used by occupants and, by combining it with an occupancy profile, predict the building's expected energy uses.

If your building has a good, reconciled sub-meter arrangement, you can record measured and disaggregated energy use which will help to identify and quantify discrepancies and identify any new opportunities for energy savings.

In order to use the TM22 and similar spreadsheets, you'll need data from sensors, thermostats and meters. However, even if your building is minimally monitored, has no building management system (BMS) or only a main electricity/gas meter or simple, programmable timer for HVAC systems, space and water heating, you can still use this information in combination with an estimate (or actual count) of hours used by energy-using services and equipment (including lights and computers) to get a pretty good estimate of where, when and how energy is being used in your building.

If this is starting to sound a bit complex, think of the savings you're almost guaranteed to make.

It's also reassuring to know that specialist help is available through numerous consultancies and (in the United Kingdom) charities such as the National Energy Foundation. Many organisations will even offer advice without up-front costs in exchange for a share of any financial savings made.

There are two other key aspects to building performance evaluation that contribute significantly to energy performance evaluation: site inspection and occupant surveys.

SITE INSPECTION

Site inspection is about taking a good look (and listen) at your building; from top to toe, inside to outside and boardroom to plant room.

Look at the fabric of the building; look for hot spots in summer and cold spots in winter. Also look out for draughts, doors that don't quite close, cracked or broken windows, and gaps around services penetrations or where modifications have been made.

Look at services themselves, and especially HVAC systems; and check for lagging of pipes, excessive fan noise or programming that doesn't fit occupancy patterns.

Consider the settings and controls in the building. Are offices and meeting rooms too hot or cold? Do they have both heating and air-conditioning (potentially fighting each other)? Do factory floors and loading bays have large doors that stay open for longer than necessary? What about compressed air leakage? Is internal or external lighting left on overnight? How do cleaning staff leave the building? Is office equipment left on when not in use?

Site inspection is about taking a good look (and listen) at your building; from top to toe, inside to outside and boardroom to plant room.

Photograph courtesy of CIBSE

Ideally, carry out one site inspection during occupied hours and another when the building is not being used. Ask yourself: *how much energy is my building using when I'm not using it*?

Because the vast proportion of this energy is simply wasted, it can be a quick "win"; offering potential savings without impacting on any of the building's normal activities.

OCCUPANT SURVEYS

The final component of building performance evaluation (and one that is not to be underrated) is the perspective of occupants.

A structured survey method such as the Building Use Survey (BUS) which has been honed for more than 30 years following research in the United Kingdom into non-domestic post-occupancy building evaluations and includes a large database of properties already surveyed, provides maximum benefit to the surveyor as well as benchmarking against other buildings in terms of a range of comfort factors.

Alternatively, occupant feedback can be captured using a *home grown* survey at very low cost and, most importantly, individual and collective survey data

The final component of building performance evaluation (and one that is not to be underrated) is the perspective of occupants.

can be cross-referenced with other information from site surveys and energy monitoring to identify wasted energy.

Consider, the example of glare on computer screens which often results in occupants of offices drawing window blinds and using additional artificial lighting during daylight hours. A simple change of the office layout can address the root cause of the problem and thereby reduce energy consumption whilst also improving the working environment.

Energy performance evaluation will increasingly be an essential responsibility of Facilities Managers and will benefit all building stakeholders; from shareholders to employees and customers.

And whilst you're likely to need external expertise when evaluating complex buildings, it is possible with only a little help, training and support to undertake basic evaluations of building energy performance.

Ultimately, all that's really required is a common sense approach, good observational skills and a willingness to act on any findings!

Temporary HVAC installation at Hamad International Airport (HIA), Doha.

Keeping Cool

For more than 20 years Aggreko has been a key partner in the impressive infrastructure development that has taken place across the Gulf region. Known primarily for its power rental business and long association with the Dubai Rugby Sevens (which includes sponsorship of the Aggreko Dynamos team), the company is the world leader in the supply of rental temperature control solutions.

Aggreko has come a long way since opening its first regional offices at Sharjah in 1991. The company now operates from 11 service centres in the wider Middle East/Central Asia region (its geographical reach extends to Kazakhstan), and inaugurated its latest, Istanbul office in 2012.

"We have grown the business and expanded our temperature control fleet exponentially to meet industry demand", explains Bill Kearns, Head of Temperature Control at Aggreko Middle East, before adding that the company supplies solutions to a wide range of industries and identifying manufacturing, food processing, oil and gas, construction, facilities management and event-related industries as the heaviest users of rental temperature control equipment.

Because of its proximity to customers through its Middle East depot network and sizeable, locally-based, fleet of vehicles typical jobs can range from supplying emergency chillers for commercial buildings following air conditioning failure, to providing temporary cooling towers at manufacturing plants to enable production to continue despite equipment failure.

In a region that experiences sweltering summer heat, temperature control within indoor environments is a major consideration for all businesses.

Case Study:

Hamad International Airport (HIA)

During the construction of Hamad International Airport (HIA) in Doha, Aggreko supplied a turnkey cooling package that utilised high ambient, air-cooled, chillers to provide a cooling solution to the cargo hangar.

"Our customer, C.A.T. International required the main cargo hangar to be air-conditioned whilst they worked to complete the fit-out against an extremely tight schedule," says Mr Kearns.

Working closely with the contractors from the initial design brief through to project approval, installation and commissioning, Aggreko supplied a 2,500 metric tonne (MT) chiller package, together with 5 megawatts of auxiliary power generation.

The project was staffed by a dedicated team of engineers and technicians throughout its 13-month lifespan.

Aggreko technician working on temperature control equipment.

"By supplying this solution to the project we were able to assist the client in effecting a smooth transition between temporary and permanent cooling systems, and dramatically minimised any downtime in construction activity," recounts Mr Kearns.

Rental temperature control equipment is often used to provide additional cooling capacity during the summer months. At major public events, the focus is on "comfort" cooling.

Aggreko also supports the majority of facilities management companies operating in the region with power and temperature control offerings.

Kearns adds: "When air conditioning systems shut down temperatures soon become unbearable, forcing both residential and commercial tenants to find cooler, more comfortable surroundings".

Having access to a reliable and experienced temperature control provider that is able to supply rapid, turnkey temporary solutions is a major advantage for any facilities management company.

When air conditioning systems shut down temperatures soon become unbearable, forcing both residential and commercial tenants to find cooler, more comfortable surroundings.

Stan Atkins

Standing Tall

Stan Atkins, British Institute of Cleaning Science (BICSc) Group Chief Executive Officer, discusses global cleaning standards and the importance of training cleaning operatives working in facilities management.

The on-going protection of assets is an essential requirement of the built environment and one that extends beyond "hard" FM disciplines including maintenance of a facility's systems and external fabric, to cleaning and other "soft" services that focus on creating a pleasant indoor atmosphere for building occupants and visitors.

A facility is operated by a team whih includes cleaning operatives as an integral part. And, despite cleaning activities often being labelled *low risk*, there are ever present commercial pitfalls facing cleaning providers working in facilities management.

This is because it is difficult for operatives to second-guess the degree of performance clients require; especially when many clients misunderstand the need to define realistic outcomes.

Indeed, multiple factors influence service delivery and this is the principal argument in favour of the wider adoption of published cleaning standards.

Core Causes of Poor Service Delivery

Incorrect and difficult to clean/maintain elements and finishes within the facility

Poorly trained operatives

Wrong choice of cleaning equipment or materials

Ambiguous view of the final cleaning outcome

Insufficient staff to complete the cleaning operation

Insufficient time to complete the cleaning operation

Communication failure between the client and cleaning provider

Communication failure between the cleaning provider and the cleaning team

Adverse weather conditions

Increased footfall/occupancy

… membership bodies and major corporates will often compete against each other to publish "standards" pertaining to identical areas of activity but succeed only in exposing fundamental differences of opinion about what really does constitutes best practice

Global Cleaning Standards

Standardisation has been defined as a "framework of agreements to which all relevant parties in an industry or organisation must adhere to ensure that all processes associated with the creation of a good or performance of a service are performed within set guidelines".

According to this definition, the purpose of standardisation is to ensure consistency in the quality of goods produced or services delivered and to facilitate comparison between *like* products and services.

Even within the same industry, however, membership bodies and major corporates will often compete against each other to publish "standards" pertaining to identical areas of activity but succeed only in exposing fundamental differences of opinion about what really does constitute best practice.

Fortunately the cleaning industry is different. Of the major standard providers only The International Sanitary Suppliers Association (ISSA) and The British Institute of Cleaning Science (BICSc) produce systems solely for use in the cleaning industry, making them true specialists in this field. Moreover, whilst other standards are available, few have secured widespread international acceptance.

The Cleaning Industry Management Standard (CIMS) Programme

ISSA operates the Cleaning Industry Management Standard (CIMS) programme which is designed to manage the outcomes of existing processes whilst highlighting areas for improvement and promoting best practice across functions as diverse as service delivery, human resource management and environmental stewardship.

The IMS programme is client-driven and adaptable to a range of customer requirements. It has been designed to meet the needs of management personnel, however, and is most effective when it is used for creating specifications rather than in providing guidance to cleaning operatives about the performance of specified skills.

Florence Nightingale

Healthcare & Cleaning Standardisation

The healthcare sector has been a major influence on the development of cleaning standards.

In the United Kingdom the launch of the National Health Service in 1948 (the NHS was the first state-run organisation to provide free, universal healthcare) placed scrutiny on hospital hygiene since the relationship between the cleanliness of facilities and disease was well understood (in 1858 Florence Nightingale had lobbied successfully for the establishment of a Royal Commission to investigate sanitary conditions in India).

More recently, publication of the *National Specification for Cleanliness in the NHS* (2007) resulted in the distribution of a set of detailed standards and practice guidelines to healthcare facility operators; alongside proposals for the introduction of a national "colour coding" system for prioritising cleanliness across all areas of hospital buildings (an idea BICSc had suggested as a solution for "standardising" otherwise unsynchronised systems).

Internationally, standards and best practice guidelines relating to infection prevention in care are published by several organisations including the World Health Organisation (WHO), International Federation of Infection Control (IFIC), American Society for Healthcare Environmental Services (ASHES) and The Association of Healthcare Cleaning Professionals (AHCP) in the United Kingdom.

BICSc Standards

BICSc produces a range of cleaning operative-focused standards.

The key areas these cover are:

- PROFICIENCY
- COMPETENCY
- TECHNICAL STANDARDS

They are encompassed by the Cleaning Proficiency Skills Suite (CPSS) - on completion of mandatory units, the cleaning operative is awarded a licence to practise (LTP) which is valid for three years and admitted as a practitioner member of the institute (PBICSc).

Cleaning outcome criteria

Standards required on completion of service delivery are set out in the BICSc *Best Value* document which is designed to remove ambiguity from output-based specifications.

Selection of equipment, materials & cleaning methodology

BICSc operates the Accredited Cleaning System (ACS) standard which provides annual accreditation of cleaning systems to ensure that they contain four key elements:

1. **Product**
2. **Methodology**
3. **Bespoke training plan**
4. **Consistent outcome**

Standards required on completion of service delivery are set out in the BICSc Best Value document

Independent Quality Cleaning Inspections (i-CQI)

Inspections are performed by BICSc personnel for the sole purpose of ensuring an independent assessment of quality standards.

A consensus-based, Acceptable Quality Level (AQL) model takes into account the opinions of the client, contractor and BICSc staff in defining the standard that will be used for assessment; with the AQL usually being set at between 90 per cent and 98 per cent.

i-CQI enables factors that are particular to any facility to be taken into account (including condition, the type of facility and even the usual cleaning frequency).

BICSc: Delivering Best Value

A BICSc accredited cleaning system:
The Rubbermaid HYGEN™ Clean Water System

The need for training

Correct training of cleaning operatives and supervisors and skills refreshment are essential since agreed standards of service delivery are a pre-requirement of successful contract fulfilment.

Training also reduces client dissatisfaction and eliminates the need for "rework" (and hidden costs associated with time originally spent on tasks or original materials and equipment costs) by addressing the most common reason for poor service delivery which is method failure or the application of incorrect techniques to the cleaning of elements within a facility.

Whilst BICSc has been established in the United Kingdom as a training and membership organisation for more than half a century, it is only in recent years that the institute has developed a strategy for sharing its knowledge and expertise and promoting cleaning standards globally.

Today BICSc International trains more than 6,000 cleaning operatives and institute members around the world.

In the Gulf countries, training is delivered through a network of accredited training organisations (ATOs).

Today BICSc International trains more than 6,000 cleaning operatives and Institute members around the world.

The Lotus Effect

Leaf of the Lotus Plant (Nelumbo nucifera)

WHAT IS NANOTECHNOLOGY?

Nanotechnology has been defined as the ability to build materials, devices and systems with atomic precision. It works at the molecular level (atom by atom) by reorganising molecules into larger structures. Nanotechnology aims to control new structures at the atomic, molecular and super molecular levels.

Nanotechnology systems must also exhibit three characteristics:

- At least one dimension ranging from 1-100 nanometres (nm).
- Design methodologies that demonstrate control over the physical and chemical attributes of molecular sized structures.
- Composition from "building blocks" which can be made into larger structures.

An Introduction to Nano Cleaning & Maintenance Coatings

The ability to self-clean is essential in hydrophyte plant species which inhabit waterlogged soil and other water environments. This is because photosynthesis is interrupted by excessive deposits of mud on the surface of leaves.

The Lotus Plant (Nelumbo nucifera) has developed a cleaning mechanism that is often referred to as the "Lotus Effect" and is possible because of the formation of rough bumps (epicuticular wax crystalloids) on its leaves which reduce adhesion to water droplets. Simultaneously, at the micro-level, interstitial spaces within each area of roughness create room for water polar molecules to attract and form spheres. And it is these spheres that clean the leaf by first attracting and then adhering to dirt particles; before rolling off the leaf entirely, aided by gravity and wind tilt.

Nano coatings are essentially nanoparticles dissolved in a carrier material (usually

Nano coatings have been demonstrated to reduce, and even eliminate entirely, the need for complex cleaning and restoration processes.

ethanol or an ethanol substitute and water in Middle Eastern countries).

They work by spreading across substrates before forming 3D, network-like structure when the carrier material nanoparticles are dissolved in is volatised (i.e. evaporates). The result of this process is a finely-spaced, bumpy surface that mimics the hydrophobic qualities of the Lotus leaf.

Nano Coating Applications

Nano coatings are increasingly being applied in a variety of building maintenance and cleaning applications:

Concrete and Natural Stone

When applied to concrete and stone, nano coatings will impregnate the substrate and react chemically to create a non-sticky layer that is steam permeable and protects the target area from damage without altering its appearance or colour.

Typical applications for coatings include building façades made from concrete, marble, sandstone, brick and granite; concrete and stone flooring, and decorative and ornamental features and monuments.

Glass & Ceramic

Despite their smooth appearance, substrates made from glass and ceramic attract

dirt, dust, bacterial and other waterborne and airborne contaminants which can degrade performance and appearance over time.

Nano coatings have been demonstrated to reduce, and even eliminate entirely, the need for complex cleaning and restoration processes. Typically, they will form a hard, durable, protective layer which covers microscopically-pitted glass or ceramic with a smooth, water repellent layer. In turn, this reduces adhesion to contaminants and facilitates cleaning since, in common with the Lotus leaf, all that is usually required is a good wash down.

Non-slip Hard Flooring Treatments

Nano coatings are a versatile innovation. Aside from imparting hydrophobic qualities, they typically increase static co-efficiency: a quality that is desirable in

hard flooring (liability for slip-related accidents in the United Kingdom alone is estimated at £0.5 billion annually).

Floors made from concrete and hard minerals can be made safer by applying Nano coatings. Chemical treatment creates an invisible but sophisticated tread design that substantially increases slip resistance.

We have learnt that applying Nano coatings reduces maintenance, renovation and cleaning costs, and also helps to protect building owners from slip-related liability claims.

From a facilities and asset management perspective there is clear evidence Nano coatings increase the service life of treated substrates and increase asset values by maintaining their aesthetic appearance.

Yet innovation is only meaningful when it helps to improve quality of life; a function Nano coatings achieve by making buildings cleaner and safer places to visit, work and live in.

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Painted by JOTUN

Did you know that the biggest suite at Burj Al Arab is a huge 780 square metres and has a private cinema and spa? There are good reasons why the hotel in Dubai is described as the most luxurious in the world. It is no coincidence that Jotun supplied the paint.

Did you know that Jotun has 9,500 employees in more than 90 countries? We supply paints and coatings that have been specially developed for unique conditions. The world of Jotun is diverse, but we have one common agenda:

Jotun Protects Property

Jotun Protects Property
jotun.com


JOTUN DECORATIVE PAINTS


JOTUN PROTECTIVE COATINGS


JOTUN MARINE COATINGS


JOTUN POWDER COATINGS

Dare or Dai

In 2010 observations about the Burj Khalifa from the President of the 4,000 member Verband Deutscher Architekten- und Ingenieurvereine (DAI is the Federation of German Architectural and Engineering Associations and one of Europe's most influential professional bodies), made international headlines. In an exclusive interview with *FM Magazine*, Professor Christian Baumgart reveals his comments were reported outside the context of his wider vision for the future development of the Gulf.

You are quoted as saying the Burj Khalifa, "hardly represents a sustainable contribution to current world building practices". What might the architectural team have done better?

The critique from 2010 regarding the Burj Khalifa skyscraper was not intended to be a criticism. In fact, what was criticised was the sheer focus on technical achievements and record-breaking financial figures relating to its construction.

In terms of architecture, building culture, urban planning, architectonic requirements and quality characteristics; materialistic concerns such as whether a particular building will be *taller*, *wider* or *larger* than another are unimportant.

Professor Christian Baumgart

Masdar City: good consciousness of tradition and historic forms

Instead, there should be a sensitive analysis of the specific requirements of each location and region.

We believe these factors should be combined with cautious planning and implementation that takes account of the sustainable interplay between ecology and economy.

New York has its Freedom Tower, London its Canary Wharf, the Shanghai Tower is nearing completion and even Frankfurt boasts the Commerzbank Tower. Why should cities in the Middle East be any different?

In the view of the DAI, the same challenges apply to construction and building in the tradition of European cities as are faced today by mega-cities in rapidly growing regions of our world.

In many GCC capitals cityscapes are new. If a cityscape is synonymous with a city's global branding, couldn't it be argued iconic buildings such as the Burj Khalifa are necessary?

Obviously, the right of each city (including New York City, London, Shanghai and even Frankfurt which you mention) to have its landmarks must be guaranteed. However, from my perspective, certain requirements in terms of building culture are not being fulfilled or developed further.

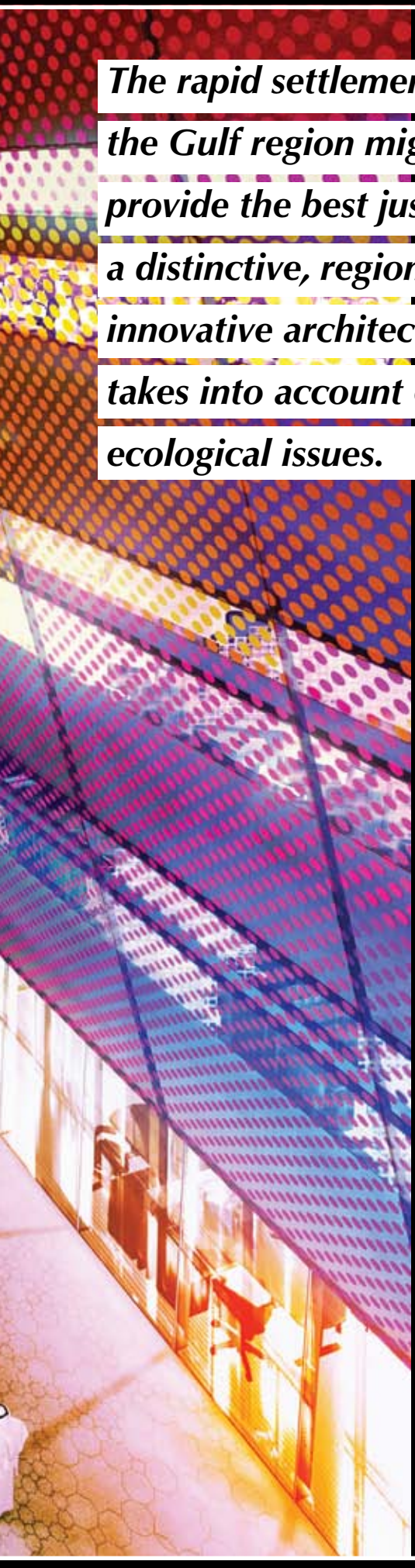
Apart from that, the respective spatial and historical contexts must be considered. Even in

…the same challenges apply to construction and building in the tradition of European cities, as are faced today by mega-cities in rapidly growing regions of our world.

European megacities, there are big differences in terms of compatibility of skyscrapers with particular skylines.

Are your beliefs influenced by planning practices in Germany?

Generally speaking, my perception is influenced greatly by the history of European cities. Nevertheless, it cannot be the goal of humanity to construct skylines all over the world that have the same shape and consequently enter into a form of “skyscraper



The rapid settlement development i
the Gulf region might, in my
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ecological issues.

building" competition.

So what do you believe the urban landscape in the GCC should look like?

The rapid settlement development in the Gulf region might, in my opinion, provide the best justification for a distinctive, region-typical and innovative architecture that also takes into account economic and ecological issues.

The Gulf region enjoys worldwide attention. It acts as a stimulus for the global economy and is a highly attractive destination for tourists not only from Western countries, but also for millions of people in the Far East. As such, the region bears a heavy responsibility which it generally lives up to. Two good examples of this are the Sultanate of Oman and Abu Dhabi's Masdar City; which demonstrates consciousness of tradition and historical forms within a new building project.

Indeed, a singular culture, geographic landscape and climatic situation across the region, provide all of the ingredients that are necessary for intensive planning and development of any "Future City". Here, opportunities and project sizes are less constrained than in central Europe where urban planners have to take settlement patterns and building history into context.

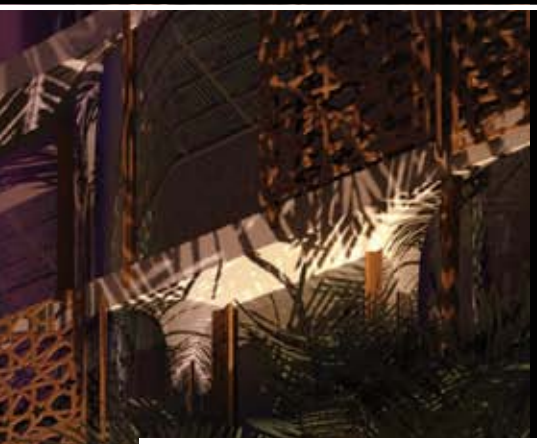
What are your views about the extensive use of glass as a material for building facades in the region?

The extensive usage of glass elements as construction or design forms has been, and still is, acknowledged worldwide. Having said that, we know the transparency, impact on energy consumption, and even durability of the substrate is not always as desired.

DAI conducts research into building and roofing materials - can you envisage a replacement for glass?

There is strong market demand for engineers and architects to develop new, aesthetically pleasing substrates using new and existing materials and composites. This is especially the case in regions with intensive solar radiation, since "complete" solar facade systems are required to support new energy standards, construction techniques, design criteria or even building orientations.

Of course, when considering sustainability, the form of particular buildings, structure of the construction mass, density of built-up areas; and the balance between "closed" and "open" facades, are all crucial.



…the task of the urban planner or architect is not merely to copy or surpass things that already exist but also to exhibit the courage that is required when embracing the new.

Architectural education and practice will increasingly demand closer interdisciplinary cooperation with energy management and engineering professionals – DAI calls this integrated approach "Future Architecture".

Do you believe Dubai's new Green Building Code, which becomes mandatory for new building and refurbishment projects next year, will guide architects in the right direction?

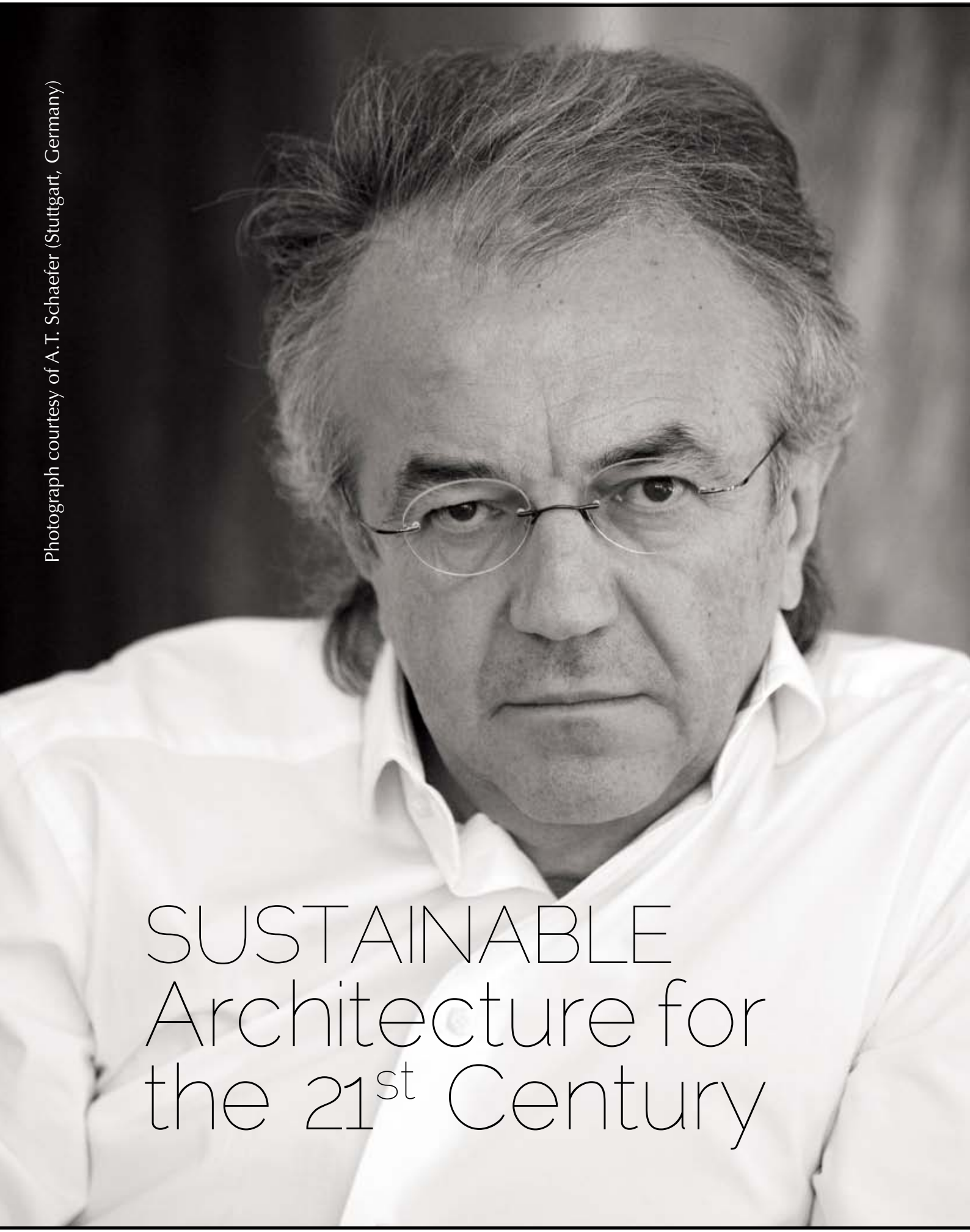
Without even attempting to go into detail, I can say the new Dubai "Green Building Code" definitely provides a basis forfor appropriate architectural approaches. It also symbolises a now region-wide commitment which extends beyond merely using modern and innovative construction techniques, to actually planning and building in a future- oriented way.

If you were made responsible for all planning approvals across the GCC, which two requirements or restrictions would you place on architects?

City planners and architects in the Gulf need to show greater awareness of the privileged position they enjoy by virtue of being commissioned to set new goals and build pieces of a new future in one of the most exciting regions of the world.

Architects should not only respect and acknowledge spatial, geographic and climatic requirements, but must also rise to the challenge of creating buildings that are both unique and region-specific.

After all, the task of the urban planner or architect is not merely to copy or surpass things that already exist but also to exhibit the courage that is required when embracing the new.



Photograph courtesy of A.T. Schaefer (Stuttgart, Germany)

SUSTAINABLE Architecture for the 21st Century

Multi-award winning architect, Director of the Stuttgart Institute of Sustainability (SIS) and holder of the Mies van der Rohe Chair at the Illinois Institute of Technology (IIT), Professor Werner Sobek, discusses the influence of sustainability on design.

The development that has taken place in our office over the last 20 years mirrors the changes that have taken place in the general building industry. Designing, constructing and managing a building has become a much more complex process, with an increasing focus on long-term perspectives rather than short-term profits. Where our services were initially offered as highly specialised designers and structural design engineers in the field of ultra-lightweight facades, this soon extended to the in toto design of building structures, and within just a few years to include facade planning. It was vital to overcome the interface between the load-bearing structure and the facade, which taken together make up approximately 40 to 60 per cent of a building.

The next logical step was to extend our expertise in the fields of energy saving and recycling-friendly design, and to aim to improve the emission characteristics of buildings with the founding of the subsidiary company, WSGreenTechnologies. Interwoven with this evolution of design engineering praxis has been the related orientation to research and experimentation carried out through the medium of an academic chair and the leadership of the Institute for Lightweight Structures and Conceptual Design (ILEK) at the University of Stuttgart. It is this duality of involvement that has enabled our firm to continuously refine and redefine its approach for a sustainable architecture ready for the 21st century.

The following article describes the aspects that we consider most important and that have the biggest influence on our work.

House R128

Transparency

Photograph courtesy of Roland Halbe (Stuttgart, Germany)

The design of housing is continually used by the practice to further develop its architectural concepts and underpin these with engineering advances. House R128 in Stuttgart (2008) is just such an experiment. It is an attempt to comprehend the archi-structural nature of three-dimensional transparency. The significance of R128 is to be found in the fact that transparency has here for the first time been achieved and experimented with in the third dimension, beyond the prismatic precedents of Mies van der Rohe and Philip Johnson. It is the first building in which interpenetrating sight lines are possible across four storeys.

In order to experiment with three-dimensional transparency and to experience its experiential and psychological attributes, the house was built as a personal lived-in experiment. Such a level of transparency can also be built on a large scale. Architect Christoph Ingenhoven has proven this time and again with his work: particularly significant examples of this are the European Investment Bank in Luxembourg (2007) and the Lufthansa Aviation Center in Frankfurt (2005). The Lufthansa building is located in a very difficult urban environment between the airport, railway, dual carriage way and motorway. Despite this, all of the offices are open, flooded with daylight, naturally ventilated, and offer wonderful views of the green inner courtyards. In this case the ideal of transparency is not restricted to the building envelope, but is continued throughout the inside of the building providing open, communicative structures that encourage interaction. These attributes also apply to the Post Tower in Bonn designed by Helmut Jahn (2003). The offices in this high-rise building are open to views of the surrounding area; it is possible to open windows on every level to allow fresh air into the rooms. These are examples of the experiential and environmental attributes of transparency.

A fundamental research question is: How does transparency relate to other design engineering principles that ultimately contribute to ecological design?

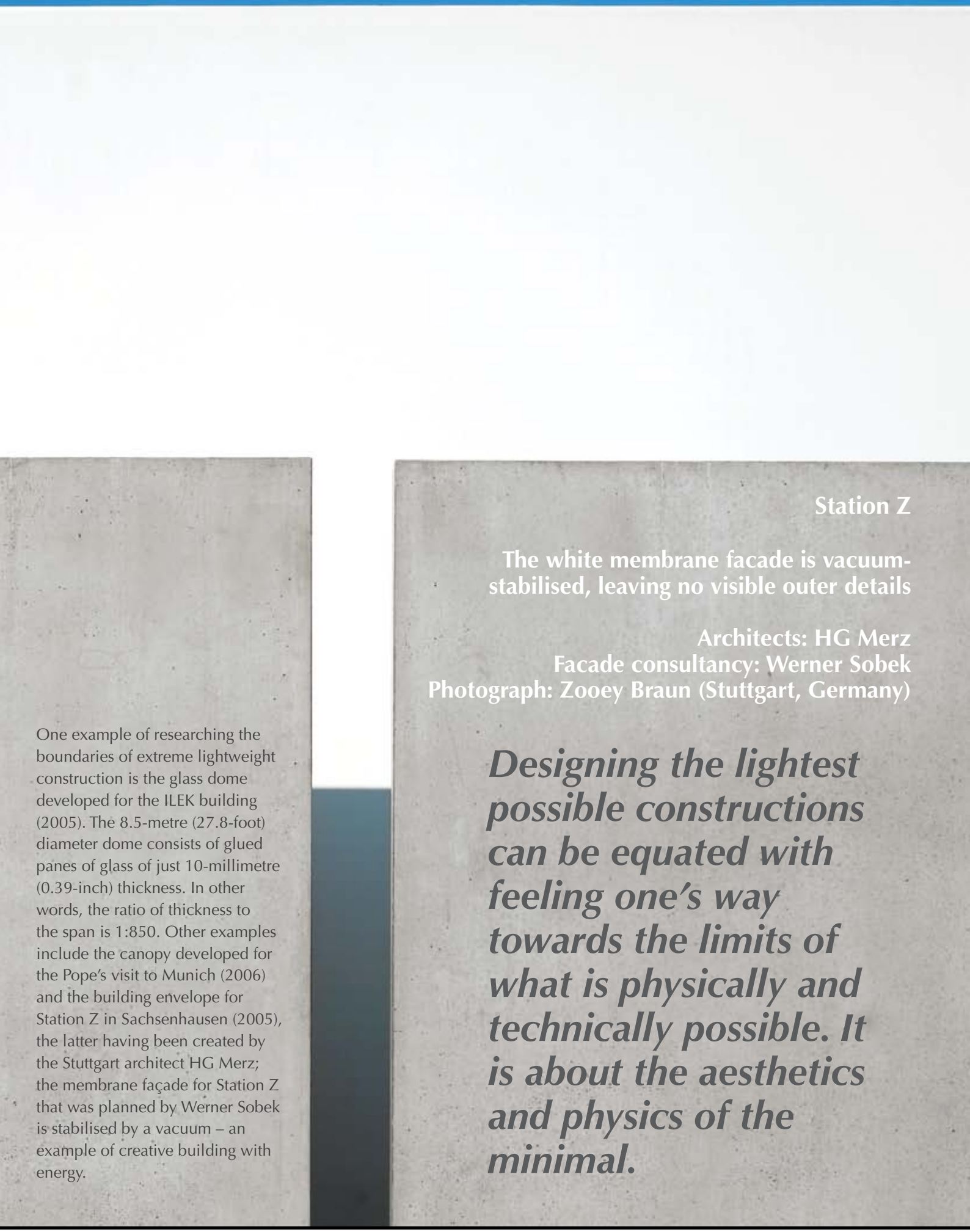
A fundamental research question is: How does transparency relate to other design engineering principles that ultimately contribute to ecological design? Werner Sobek seeks to build structures that do not consume fossil fuels, do not generate any emissions and are completely recyclable. All of these things should belong to the fundamentals of designing; a point that also applies in particular to higher education at our universities, just as much as questions of structural stability, facade technologies and so on.

LIGHTWeightNESS

Lightweight constructions are a precondition for transparency. Lightweight construction means the dematerialisation of objects, to optimise weight to the limit of the possible, reducing integrated grey energy. The search for lightweight constructions is the search for boundaries.

Designing the lightest possible constructions can be equated with feeling one's way towards the limits of what is physically and technically possible. It is about the aesthetics and physics of the minimal, and it is about stepping across the dividing lines between scientific disciplines. As far as constructions that bridge long span widths, reach great heights or move are concerned, reduction of self-weight load is an economical necessity and is also often the precondition for physical implementation. Irrespective of scale, lightweight design means savings on the mass of material deployed, and for the most part, also with regard to the amount of energy used. It is here that the ecological aspect begins: building light becomes a theoretical and ethical position.

A resolute approach to lightweight constructions requires modifications to the traditional structures of the design process. Establishing system geometries, forming and proportioning load-bearing structures as well as the selection of materials must primarily adhere to the requirement to save weight with other requirements taking on secondary importance; for example, those resulting from architectural considerations or from manufacturing techniques. Moreover, it is not possible to create a design of structural systems of minimal weight on the basis of a simple addition of the geometrically determined building components such as supports, balconies, arches, slabs, shear walls and so on. It is much more the case that the architect or engineer creating a lightweight construction designs spatial force paths, in other words, purely statically conditioned structures, for which he or she subsequently selects suitable materials. Thus the logic of lightweight building is a radical, or fundamental, principle for ecological design.



Station Z

The white membrane facade is vacuum-stabilised, leaving no visible outer details

Architects: HG Merz
Facade consultancy: Werner Sobek
Photograph: Zooey Braun (Stuttgart, Germany)

One example of researching the boundaries of extreme lightweight construction is the glass dome developed for the ILEK building (2005). The 8.5-metre (27.8-foot) diameter dome consists of glued panes of glass of just 10-millimetre (0.39-inch) thickness. In other words, the ratio of thickness to the span is 1:850. Other examples include the canopy developed for the Pope's visit to Munich (2006) and the building envelope for Station Z in Sachsenhausen (2005), the latter having been created by the Stuttgart architect HG Merz; the membrane façade for Station Z that was planned by Werner Sobek is stabilised by a vacuum – an example of creative building with energy.

Designing the lightest possible constructions can be equated with feeling one's way towards the limits of what is physically and technically possible. It is about the aesthetics and physics of the minimal.

GEOMETRY

In discussing new structures, the question posed is: What is 'new'? Developing force conditions has nothing to do with lining up basic, geometrically determined building blocks. The task is much more about developing structures that are nothing other than the materialisation of three-dimensional, perfectly designed systems of forces. This is the only possible way to obtain structures that have a high level of structural logic and make very efficient use of materials Consequently, they radiate a very special form of inherent beauty.

Designing engineering is about the design of the three-dimensional flow of forces whose design space is dictated by architectural, climatic or other conditions. It is only after these force conditions have been optimised as much as possible that the designer turns to materialising the force fields with the material most suited to the task. For two-dimensional designs this is purely a finger exercise, but a huge amount of effort and creativity is required when such design is undertaken for three-dimensional structural integration.

Designing engineering is about the design of the three-dimensional flow of forces whose design space is dictated by architectural, climatic or other conditions.

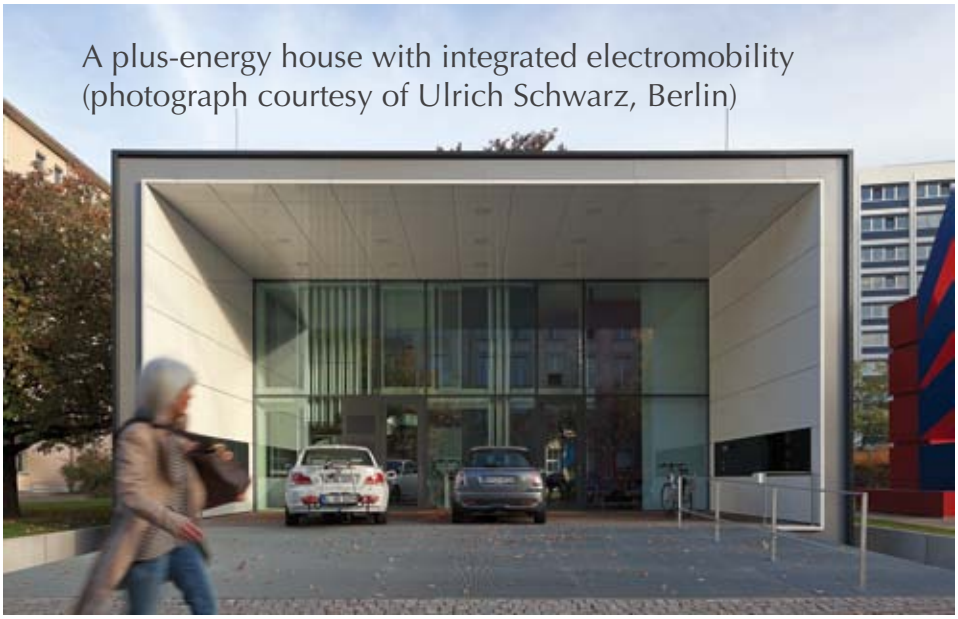
New structures frequently involve innovative geometries. In this context, however, it is not simply a matter of optimising the building from an architectural point of view, but also from the standpoints of creating energetic structural planning and production techniques. If this is not accomplished, the resulting buildings tend rather to represent aesthetically motivated endeavours potentially limited in their habitability or usability.

Working with double-curved structures, or with biomorphic structures or bubble systems, requires a deep understanding of analytical geometry. This alone provides the basis from which it is possible to make assessments regarding the feasibility of producing the structures, as well as with regard to special issues of the building process. **The Mercedes-Benz Museum** in Stuttgart (2006) is an example of the structural and materialisation conditions of complex geometrical structures. The double-curved, exposed concrete surfaces were created using a large number of formwork panels, each with a different border, produced utilising a water-jet cutting process to a tolerance of less than 1 millimetre (0.039 inches). The formwork panels were curved on site and provided a faceted surface.

Photograph courtesy of Roland Halbe (Stuttgart, Germany)

***The Mercedes-Benz Museum*: icon of contemporary architecture (Architect: UN Studio, Amsterdam/Structure & Facade: Werner Sobek)**

SUSTAINABILITY



A plus-energy house with integrated electromobility (photograph courtesy of Ulrich Schwarz, Berlin)

Today, very few succeed in building structures that fulfil the simple demands required to achieve a Triple Zero rating

If aspects of sustainability and recycling are integrated with complex geometries and dematerialised structures, then the necessity for new tools and methods becomes imperative. Building must make huge changes in the face of rapidly accelerating urbanisation, the induced consumption of energy and the resulting emissions. We have simply neglected to develop the appropriate answers to these problems through research and to develop the tools and methods with which to create the solutions. Today, very few succeed in building structures that fulfil the simple demands required to achieve a Triple Zero rating (zero energy consumption, zero emissions [not just CO2] and zero waste creation).

First examples such as R128 and House D10 which is currently being planned are experimentally pushing the production of tools in the realisation of ecological values.

A family house near Ulm demonstrates convincingly that sustainable buildings can also be strikingly beautiful (photograph courtesy of Zooey Braun, Stuttgart, Germany)

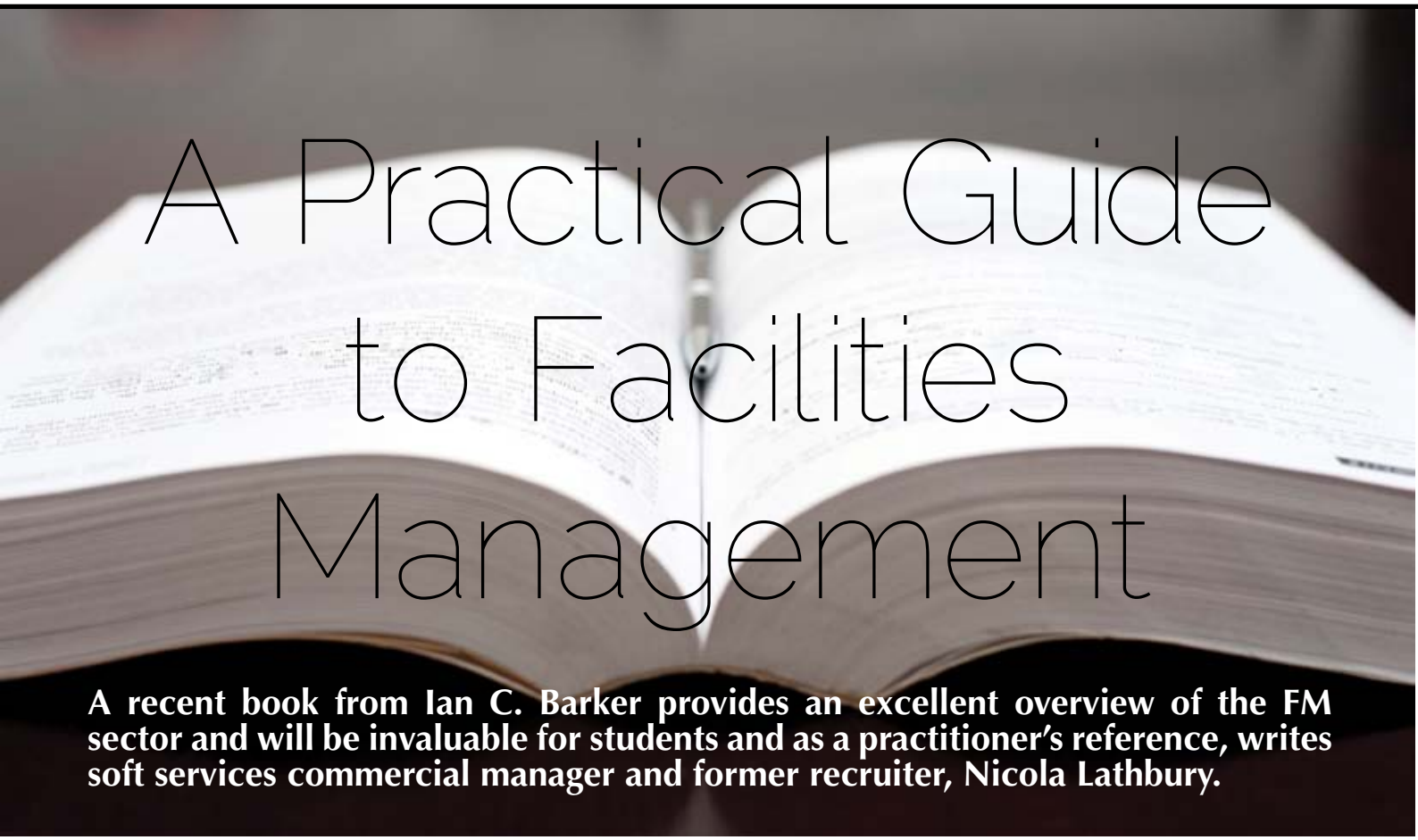
It is now necessary to take a holistic view of building and design processes, considering the entire life cycle and beyond. If the components of a building are analysed, it can quickly be concluded that the load-bearing structure has a lifecycle of 50 years and more; while in facade technology a generation cycle is significantly less than 30 years, and in technical building services the generation cycles are even shorter. Consequently, buildings should be designed in a manner that allows the individual components to be removed and replaced more easily as their various service life-cycles dictate.

The imperatives of sustainability will lead to fundamental change in the traditional relationships between architects and structural design engineers, and other engineering and management consultants.
Putting sustainability into practice requires that each individual design engineer takes into consideration complex interrelating issues such as maintenance, repair and recycling. It requires the complete integration of aspects such as energy saving, emissions reduction and more.

This cannot be achieved with the sequential planning processes as currently practised. We need to institutionalise new approaches to integral, cross-disciplinary design processes.

This might enable those of us in new integrated teams of the design engineering professions to undertake a comprehensive examination of all relevant aspects of significance for a building and its users across its entire life cycle. It would then be possible to dedicate ourselves to the most important challenges for this century's architects and engineers: to make ecology breathtakingly attractive and exciting.

…buildings should be designed in a manner that allows the individual components to be removed and replaced more easily as their various service life-cycles dictate.



A Practical Guide to Facilities Management

A recent book from Ian C. Barker provides an excellent overview of the FM sector and will be invaluable for students and as a practitioner's reference, writes soft services commercial manager and former recruiter, Nicola Lathbury.

A Practical Guide to Facilities Management is useful reading for anyone planning to take his or her first steps into the world of FM. It is informative and gives an overview of the vast number of services that fall under the FM umbrella. It's also a great starting point for 'newbies' with little or no experience of the sector and provides a solid theoretical foundation.

The book is interspersed with tips and references which are effective in breaking-up the large volume of reading material smaller, mentally-digestible "chunks".

People with non-technical backgrounds entering the sector for the first time will also find it useful because it introduces commonly used terminology and steers readers through the sea of jargon practitioners encounter on a day-to-day basis.

With numerous organisations trying to reduce costs, many people have found themselves unexpectedly moving into the world of FM. I believe these readers will find the book invaluable; especially when they start engaging specialists.

As someone who has never managed technical services as an FM, I believe the layout used for charts in the book will come in especially useful as a presentation template.

However, I do feel the publication is very much tailored to the education sector and the public sector more generally, and would like to have seen more private sector references included since these would have delivered a more rounded outlook. However, since the author has a strong background in the educational sector that is entirely understandable and most of the practices he describes are transferable anyway.

Moreover, if newcomers to the industry utilise the practices that are described from the outset and build on them as they acquire experience, they will (as the author writes): "find their own way, picking up tips and networking with various time-served professionals".
A great resource for anyone looking to get into or even engage the sector, Ian Barker's book provides valuable information on the workings of the industry and the diverse nature and ever-changing role of the facilities manager.

The author, Ian C. Barker, MCIOB adds:

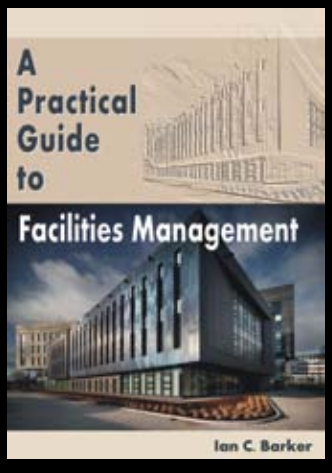
"Having worked in FM for over twenty-five years, fifteen of which were in the further education sector, my innovations in FM have resulted in tangible cost savings.

I have amassed a wealth of Experience that could benefit up and coming FMs and am passionate about my profession and how proactive facilities management can make a difference to all organisations' bottom-line results in these testing economic times. My book is a simple, practice-based guide with numerous time-saving hints and tips to help students and practitioners avoid the most common pitfalls. It provides a readily accessible and practical guide to the increasingly important subject of facilities management".

"It's real value will be in a Masters course under development ..." (Birmingham School of the Built Environment, Birmingham City University)

"Excellent for students and practitioners" (Pilger Facility Management GmbH, FM Akademie, Austria)

"I believe people are finding it more readable than some other books on FM. ... "(The College of Central London)



Get it sussed

Author: Ian C. Barker
Publisher: Whittles Publishing (www.whittlespublishing.com)
ISBN 978-184995-096-1

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Infra Oman is organised annually by FM Magazine event partner, Al Nimr Expo, in collaboration with the Sultanate's Ministries of Transport & Communications and Commerce & Industry. The 2014 event is scheduled for 20 - 22 October 2014.

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A selection of key international associations related in some way to facilities management. Any errors or om-issions are regretted but gladly received at editor@fmindustry.com

American Institute of Architects
www.aia.org
American Society of Heating, Refrigerating and Air-Conditioning Engineers
www.ashrae.org
American Society for Testing and Materials
www.astm.org
American Society of Interior Designers
www.asid.org
Association des Responsables de Services Généraux (ARSEG - French FM Association)
www.arseg.asso.fr
Asset Skills (UK FM & cleaning skills council)
www.assetskills.org
Association for Environment Conscious Building
www.aecb.net
Association for Facilities Engineers
www.afe.org
Association of Energy Engineers
www.aeecenter.org
Association of Interior Specialists
www.ais-interiors.org.uk
Association for Project Management
www.apm.org.uk
Automatic Vending Association (UK)
www.ava-vending.co.uk
British Cleaning Council
www.britishcleaningcouncil.org
British Institue of Cleaning Services
www.bics.org.uk
British Institute of Facilities Management
www.bifm.org.uk
Building Owners and Managers Association
www.boma.org
Chartered Institute of Building
www.ciob.org.uk
Chartered Institution of Building Services Engineers
www.cibse.org
Chartered Institution of Wastes Management
www.iwm.co.uk
Chartered Institution of Water and Environmental Management
www.ciwem.org
Chartered Institute of Purchasing and Supply
www.cips.org
Cleaning and Support Services Association
www.cleaningindustry.org
Construction Industry Council
www.cic.org.uk
CoreNet Global (association of corporate real estate professionals)
www.corenetglobal.org
Custom Electronic Design & Installation Association
www.cedia.net
DAI (Federation of German Architectural & Engineering Associations)
www.dai.org
Energy Efficient Lighting Association
www.iaeel.com
European Federation of Contract Catering Organisations
www.foodserviceeurope.org
EuroFM (European alliance of FM and built environment research institutions)
www.eurofm.org
Facilities Management Association (UK)
www.fmassociation.org.uk
Facility Management Association of Australia
www.fma.com.au
Facility Management Nederland
www.fmn-vereniging.nl
Global FM (alliance of FM associations)
www.globalfm.com
Health & Safety Executive
www.hse.gov.uk
Institute of Fire Engineers
www.ife.org.uk
Institute for Real Estate Management
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International Professional Security Association
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International Security Management Association
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Irish Property and Facility Management Association
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International Waste Association
www.iswa.org
ISSA - The Worldwide Cleaning Industry Association
www.issa.com
Japan Facility Management Association
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Middle East Facility Management Association
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National Association of Corporate Real Estate Executives
www.nacore.com
National Examination Board in Occupational Safety and Health
www.nebosh.org.uk
National Institute of Building Sciences
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National Institute for Occupational Safety and Health
www.cdc.gov/niosh
National Institute of Standards and Technology
www.nist.gov
Occupational Safety and Health Administration (United States)
www.osha.gov
Professional Lighting and Sound Association
www.plasa.org
Project Management Institute
www.pmi.org
Royal Institute of British Architects
www.riba.org
Royal Institute of Chartered Surveyors
www.rics.org
South African Facilities Management Association
www.safma.org.sa
The Worshipful Company of Furniture Makers
www.furnituremakers.org.uk

A is for Ask

If you're fed up with being bamboozled by industry jargon, take respite in the knowledge that you're not alone. Help is at hand in the form of the acronym index below. Simply read through, memorise, baffle colleagues and expect a pay rise within a matter of days!

ADP	Automated Dumb Process
AHU	Air handling unit
AIMSS	Advanced Integrated Maintenance Support System
AO	Alternative Officing
ASP	Application Service Provider
AWS	Alternative Workplace Strategies
BA	Cnet Building Automation & Control Networks
BCP	Business Continuity Planning
BDS	Building Data Server
BIM	Building Information Modelling
BIUAS	Building In-Use Assessment System
BMS	Building Management Systems
BOOT	Build Own Operate Transfer
BOT	Build Operate Transfer
BPO	Business Process Outsourcing
BRI	Building Related Illness.
CAD	Computer-Aided Design
CAFM	Computer-Aided Facilities Management.
CAPEX	Capital Expenditure
CBM	Condition Based Maintenance
CBW	Continuous Batch Washing
CCC	Central Communications Command
CCTV	Closed Circuit Television
CFC	Chlorofluorocarbon
CFC	Common Cause Failure
CFM	Certified Facility Manager
CIFM	Computer-Integrated Facility Management
CM	Corrective Maintenance
CMIS	Cost Management Information System
CMMS	Computerized-Maintenance Management Systems
CPAF	Cost Plus Award Fee
CPARS	Contractor Performance Assessment Reporting System
CPD	Continuous Professional Development
CPE	Contractor Performance Evaluation
CPFF	Cost Plus Fixed Fee
CPIF	Cost Plus Incentive Fee
CRE	Corporate Real Estate
CRM	Customer Relationship Manager
CSR	Corporate Social Responsibility
CTD	Cumulative Trauma Disorders
DALI	Digital Addressable Lighting Interface
DBMS	Database Management Systems
DEL	Directly Employed Labour
DSO	Direct Support organization
EAC	Electronic Access Control
EAM	Enterprise Asset Management
ECG	Electronic Control Gears
EIA	Environment Impact Assessment
EIB	European Installation Bus
EMF	Electromagnetic Fields
EMP	Environmental Master Plan
EMT	Emerging Management Team
EN	European Norm
EPBD	Energy Performance in Buildings Directive
EPC	Engineering, Procurement and Construction

ERP	Enterprise Resource Planning
ESCO	Energy Saving Company
FA	Facilities Annex
FACD	Functional Analysis, Concept, Design
FCO	Fixed Capital Outlay
FINS	Fault Equivalence Identification Numbers
FM	Facilities (or Facility) Management
FMEA	Failure Mode and Effect Analysis
FMECA	Failure Mode Effect and Criticality Analysis
FMP	Facilities Management Professional
FMS	Facility Management Simulation
FPI	Fixed Price Incentive
FPLH	Fixed Price Labour Hour
FPPI	FPPI Fixed Price Plus Incentive
FRV	Functional Replacement Value.
FTE	Full Time Equivalent
GIS	Geographic Information System
GMP	Guaranteed Maximum Price
GPRS	General Positioning System
GPS	Global Positioning System
H&S	Health & Safety
HAZOP	Hazard Operability
HCFC	Hydrochlorofluorocarbon
HEPA	High Efficiency Particulate Air
HGL	Hydraulic Grade Line
HID	High Intensity Discharge
HLD	Heavy Lifting Device
HSS	Hollow Structural Section
HSW	Health, Safety and Welfare
HTFA	High Temperature Forced Air
HVAC	Heating Ventilating and Air Conditioning
IAP	Indoor Air Pollution
IAQ	Indoor Air Quality
IBS	Intelligent Building System
ICF	Insulated Concrete Forming
ICS	In-floor Cleaning System
IDBB	Integrated Design/Bid/Build
IDBE	Interdisciplinary Design for the Built Environment
IDQLI	Indefinite Delivery Quantity Line Item
IE	Invert Elevation
IETM	Interactive Electronic Technical Manual
IFC	Industrial Foundation Classes
IHG	Incidental Heat Gain
I/I	Infiltration and Inflow
IO	Inspection Opening
IP	Internet Protocol
IPT	Internet Protocol Telephony
ISDN	Integrated Services Digital Network
ISO	International Organization for Standardization
ITS	Information Technology System
ITT	Invitation To Tender
IVR	Interactive Voice Response
JIT	Just-In-Time
JV	Joint Venture
KM	Knowledge Management
KPI	Key Performance Indicator
LAN	Local Area Network
LCC	Life Cycle Costing
LED	Light Emitting Diode
LEED	Leadership in Energy and Environmental Design
LFD	Live Finger Detection
M&E	Mechanical and Electrical
M&R	Maintenance & Rehabilitation
M2M	Machine to Machine
MDS	Maintenance Data System
MDS	Malfunction Detection System
MEP	Mechanical, Electrical, Plumbing
MFD	Multifunctional Device
MIS	Management Information System
MMS	Maintenance Management Software
MSDS	Material Safety Data Sheet
MTA	Maintenance Task Analysis
MTBF	Mean Time Between Failures
MTTR	Mean Time To Repair
NPV	Net Present Value
NRC	Noise Reduction Coefficient
O&M	Operation and Maintenance
OA	Office Automation
ODBMS	Object Database Management System
OEE	Overall Equipment Effectiveness
OH&P	Overheads & Profit
PAT	Portable Appliance Testing
PBX	Private Branch Exchange
PDA	Personal Digital Assistant
PDH	Professional Development Hours
PE	Professional Engineer
PFI	Public Finance Initiative
PHA	Process Hazard Analysis
PLC	Programmable Logical Controller
PLETSUS	Practices Leading Towards Sustainability
PM	Property Management
PMS	Property Management System
POE	Post-Occupancy Evaluation
POMEC	Property, Operation, Maintenance, Energy, Cost
PPE	Personal Protective Equipment
PPM	Planned Preventative Maintenance
PPP	Public Private Partnership
PSM	Process Safety Management
QFD	Quality Function Deployment
QMS	Quality Management System
QRA	Quanitified Risk Assesment
R&D	Research & Development
R&R	Repair and Renovation
RCFA	Root Cause Failure Analysis
RCM	Reliability Centred Maintenance
RFID	Radio Frequency Identification
RFP	Request For Proposal
RMP	Risk Management Program
RMS	Remote Monitoring System
RMS	Repetitive Motion Syndromes
RPN	Risk Priority Numbers
RTC	Resolution Trust Corporation
SBS	Sick Building Syndrome
SC	Shading Coefficient
SEER	Seasonal Energy Efficiency Ratio
SFP	Strategic Facility Plan
SHE	Safety, Health and Environment
SHGC	Solar Heat Gain Coefficient
SIS	Safety Instrumented Systems
SLA	Service Level Agreement
SPCC	Spill Prevention, Control, and Countermeasure
SSO	Sanitary Sewer Overflow
SMDB	Strong Motion Database
SMED	Single Minute Exchange of Dies
SPC	Statistical Process Control
SQL	Structured Query Language
STC	Sound Transmission Coefficient
STM	Serviceability Tools and Methods
SVA	Security Vulnerability Assessment
TFM	Total Facilities Management
TIFM	Total Integrated Facility Management
TMDL	Total Maximum Daily Load
TPM	Total Productive Maintenance
TQM	Total Quality Management
TSD	Treatment, Storage, and Disposal
TSS	Total Suspended Solids
UDL	Uniformly Distributed Load
UFA	Useable Floor Area
UH	Unit Heater
USF	Useable Square Footage
UST	Underground Storage Tank
VAV	Variable Air Volume
VDT	Visual Display Terminals
VFD	Variable Frequency Drivers
VOC	Volatile Organic Compound
WAN	Wide Area Network
W/E&SP	With Equipment and Spare Parts
WB	Welded Beam
WB	Wood Base
WBF	Wood Block Floor
WBS	Work Breakdown Structure
WC	Water Closet
WCAB	Wall Cabinet
WD	Working Drawing
WEP	Water Expansion Pumping
WFM	Workflow Management
WO	Work Order
WST	Water Storage Tank
WT	Wash Through
WTP	Water Treatment Plant
WVT	Water Vapour Transmission
XLPE	Cross-Linked Polyethylene
ZA	Zinc Annealed
ZS	Zinc-Coated Steel

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- Ms. Paola Albrito, Head of UNISDR Regional Office for Europe, United Nations
- Clive Bairsto, Global Head of Business Resilience and Continuity, National Grid, UK
- Dr. Evangelos Ouzounis, Head of Unit – Secure Infrastructure and Services, ENISA – European Network and Information Security Agency, Greece
- Troels Oerting, Assistant Director, Head of European Cybercrime Centre (EC3), Europol
- Andrew Wright, Head of Industrial Resources and Communications Services Group (IRCSG), NATO Operations Division
- Hans Das, Head of Unit DG ECHO, A5 Civil Protection Policy, European Commission
- Helena Lindberg, Director General, Swedish Civil Contingencies Agency (MSB), Sweden
- Phil Chesworth, Head of Infrastructure Portfolio, National Counter Terrorism Security Office (NaCTSO) , UK
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- Bharat Thakrar, Head of Business Resilience Services, BT Global Security, UK
- Norman Bird, Senior Technical Lead – Nuclear Security, UK National Nuclear Laboratory (NNL), UK
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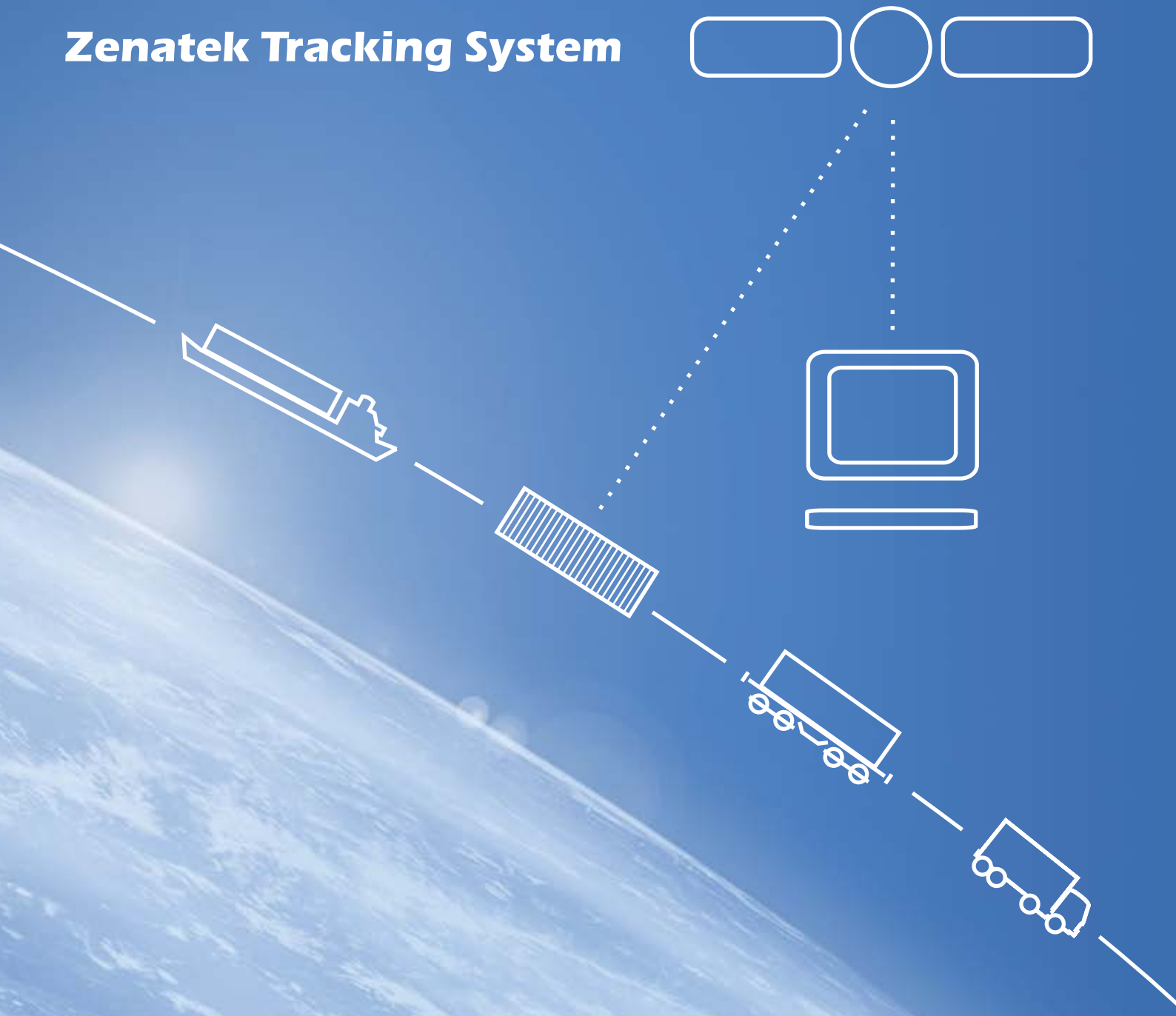

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